

MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY.

I.—THE LOGIC OF GEOMETRY.

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IN the present paper, we are not concerned with the correspondence of Geometry with fact; we are concerned with Geometry simply as a body of reasoning, the conditions of whose possibility we wish to examine. For our present purpose, therefore, we have nothing to do with crude or unformed notions of space; we have to do with the conception of space in its most finished and elaborated form, after thought has done its utmost in transforming the intuitional data. Nevertheless, we shall have occasion to remember, from time to time, that there *is* a space-intuition, and that the nature of this intuition makes the conception of space radically and permanently different, in important respects, from that of any other manifold.

I. *The Axiom of Congruence.*

Let us begin with a provisional definition. Geometry, we may say, deals with the comparison and relations of spatial magnitudes. Whether or not geometry has a wider subject-matter than this, we may for the present leave undecided; this much it certainly does deal with. The conception of magnitude, then, is, from the start, a necessary part of Geometry. Some of Euclid's axioms, accordingly, have been classed as arithmetical, and have been supposed to have

nothing particular to do with space. Such are the axioms that equals added to or subtracted from equals give equals, and that things which are equal to the same thing are equal to one another. These axioms, it is said, are purely arithmetical, and do not, like the others, ascribe an adjective to space. As regards their use in arithmetic, this is of course true. But if an arithmetical axiom is to be applied to spatial magnitudes, it must have some spatial import, and thus even this class is not, in Geometry, *merely* arithmetical. Fortunately, the geometrical element is the same in all the axioms of this class—in fact we can see at once that it can amount to no more than a definition of spatial magnitude. Again, since the space with which Geometry deals is infinitely divisible, a definition of spatial magnitude reduces itself to a definition of spatial equality, for, as soon as we have this last, we can compare two spatial magnitudes by dividing each into a number of equal units, and counting the number of such units in each¹. The ratio of the number of units is, of course, the ratio of the two magnitudes.

We require, then, at the very outset, some criterion of spatial equality; without such a criterion, Geometry would become wholly impossible. It might appear, at first sight, as though this need not be an axiom, but might be a mere definition. This, however, is not the case, for two distinct spatial magnitudes are necessarily external to one another, and cannot, therefore, as they stand, be directly compared. Euclid gives the requisite axiom in the form: "Magnitudes which exactly coincide are equal." But this form does not clearly bring out the difficulty, for if they exactly coincide, they are not only equal, but identical. It is only when he uses his axiom (as *e.g.* Bk. I. Prop. 4) that we discover the real point of it: the two magnitudes have to be *brought* into coincidence by the motion of one or both of them. Hence if mere motion could alter shapes, our criterion of equality would break down. It follows that the application of the conception of magnitude to figures in space involves the following axiom: *Spatial magnitudes can be moved from place to place without distortion*; or, as it may be put, *Shapes do not in any way depend on absolute position in space*.

The above axiom is the axiom of Congruence, or Free Mobility. I propose to prove (i) that the denial of this

¹ Strictly speaking, this method is only applicable where the two magnitudes are commensurable. But if we take infinite divisibility rigidly, the units can theoretically be taken so small as to obtain any required degree of approximation. The difficulty is the universal one of applying to continua the essentially discrete conception of number.

axiom would involve logical and philosophical absurdities, so that it must be classed as wholly *a priori*; (ii) that Geometry, if it refused this axiom, would have to set up another far more arbitrary axiom, namely that a shape given in some standard position would in any other position be some definite function of the standard shape and the change of place; (iii) that such an axiom as this last would be a mere convention, since no experience could determine the form of the function to be assumed; and (iv) that Geometry, in setting up this alternative axiom, would be guilty of a philosophic absurdity. The conclusion will be that the axiom cannot be proved or disproved by experience, but is an *a priori* condition of Geometry. As I shall thus be maintaining a position which has been much controverted, especially by Helmholtz and Erdmann, I shall have to enter into the arguments at some length.

A. *Philosophical Argument.* The denial of the axiom involves absolute position, and an action of mere space, *per se*, on things. For the axiom does not assert that real bodies, as a matter of empirical fact, never change their shape in any way during their passage from place to place; on the contrary, we know that such changes do occur, sometimes in a very noticeable degree, and always to some extent. But such changes are attributed, not to the change of place as such, but to physical causes: change of temperature, pressure, etc. What our axiom has to deal with is not actual material bodies, but geometrical figures, and it asserts that a figure which is possible in any one position in space is possible in every other. Its meaning will become clearer by reference to a case where it does not hold, say the space formed by the surface of an egg. Here, a triangle drawn near the equator cannot be moved without distortion to the point, as it would no longer fit the greater curvature of the new position; a triangle drawn near the point cannot be fitted on to the flatter end, and so on. Thus the method of Superposition, such as Euclid employs in I. 4, becomes impossible: figures cannot be freely moved about; indeed, given any figure, we can determine a certain series of possible positions for it on the egg, outside which it becomes impossible. What I assert is, then, that there is a philosophic absurdity in supposing space in general to be of this nature. On the egg we have marked points, such as the two ends: space is not homogeneous, and if things are moved about in it, it must of itself exercise a distorting effect upon them, quite independently of physical causes; if it did not exercise such an effect, the things could not be moved. Thus such a space would not be homogeneous, but would have marked points,

by reference to which bodies would have absolute position, quite independently of any other bodies. Space would no longer be passive, but would exercise a definite effect upon things, and we should have to accommodate ourselves to the notion of marked points in empty space; these points being marked, not by the bodies which occupied them, but by their effects on any bodies which might from time to time occupy them. This want of homogeneity and passivity is, however, absurd; no philosopher has ever thrown doubt, so far as I know, on these two properties of empty space; indeed they seem to flow from the maxim that nothing can act on nothing, for empty space is rather a possibility of being filled than a real thing given in experience. We must, then, on purely philosophical grounds, admit that a geometrical figure which is possible anywhere is possible everywhere, which is the axiom of Congruence.

B. *Geometrical Argument.* Let us see, next, what sort of Geometry we could construct without this axiom. The ultimate standard of comparison of spatial magnitudes must, as we saw in introducing the axiom, be equality when superposed; but need we, from this equality, infer equality when separated? For the more immediate purposes of Geometry, I believe this would be unnecessary. We might construct a new Geometry, far more complicated than any yet imagined, in which sizes varied with motion on any definite law¹. Suppose the length of an infinitesimal arc in some standard position were ds ; then in any other position p , its length would be $ds \cdot f(p)$, where the form of the function $f(p)$ must be supposed known. But how are we to determine the position p ? For this purpose, we require p 's coordinates, *i.e.* some measure of distance from the origin. But the distance from the origin could only be measured if we assumed our law $f(p)$ to measure it by. For suppose the origin to be O , and Op to be a straight line whose length is required. If we have a measuring rod with which we travel along the line and measure successive infinitesimal arcs, the measuring rod will change its size as we move, so that an arc which appears by the measure to be ds will really be $f(s) ds$, where s is the previously traversed distance. If, on the other hand, we move our line Op slowly through the origin, and measure each piece as it passes through, our measure, it is true, will not alter, but then we have no means of discovering the law by which any element has changed its length in coming to the origin. Hence, until we assume our function $f(p)$, we have no means of determining p , for we have just seen that distances

¹ Cp. Cayley's *Sixth Memoir upon Quantics*, and Klein's development of it in his *Vorlesungen über Nicht-Euklidische Geometrie*, Vol. I. Chap. ii.

from the origin can only be estimated by means of the law $f(p)$. It follows that experience can neither prove nor disprove the constancy of shapes throughout motion, since, if shapes were not constant, we should have to *assume* a law of their variation before measurement became possible, and therefore measurement could not itself reveal that variation to us.

Nevertheless, such an arbitrarily assumed law *does* give a mathematically possible Geometry. The fundamental proposition, that two magnitudes which can be superposed in any one position can be superposed in any other, still holds. For two infinitesimal arcs, whose lengths in the standard position are ds_1 and ds_2 , would in any other position p have lengths $f(p) \cdot ds_1$ and $f(p) \cdot ds_2$, so that their ratio would be unaltered. From this constancy of ratio, as we know through Riemann and Helmholtz, the above proposition follows. Hence all that Geometry requires, as a basis for measurement, is an axiom that the alteration of shapes during motion follows a definite known law, such as that assumed above.

This law, since it is a prerequisite of measurement, cannot be derived from experience, but must be arbitrarily assumed. Mathematically, in short, it is a mere convention. But philosophically, as we have seen, any form for the law, except the special form contained in the axiom of Congruence, involves absolute position and an action of empty space *per se* on things. Fortunately, therefore, where experience leaves us in the lurch, we have an *a priori* ground for accepting the geometrically simplest alternative, viz., that shapes are completely independent of motion in space.

As the axiom of Congruence is the most fundamental of all the axioms of Geometry, and as the Pangeometers have generally held that it is derived entirely from experience of rigid bodies, I may perhaps be pardoned for dwelling on it a little longer. If I am right in contending that this axiom is necessary *a priori*, Helmholtz's view, that it asserts the rigidity of actual bodies, is already disproved. For, as he rightly points out, such rigidity could only be proved empirically, and the axiom would therefore be itself empirical, as much as the law of gravitation. But if what I have said about its necessity for Geometry is correct, Helmholtz's view involves a logical fallacy: for unless we assume congruence, or the more general axiom suggested above, there would remain no geometrical method of discovering whether or how a body had changed its shape in moving from place to place, and we could thus never discover whether there were rigid bodies or not. Since our own bodies would have to share the change when we moved, there is no reason for supposing that our sensations would reveal the

change to us; indeed the whole conception of spatial magnitude becomes meaningless, and there would therefore be nothing left for sensations to tell us about it. If our measure changed its shape, as it would have to do, in the same manner as the thing measured, we could never discover such change. But, a supporter of Helmholtz might object, unless you assume your measure to be a rigid body, *you* are equally unable to measure things—and rigidity *can* only be known by experience. Unless you assume some bodies, such as the platinum bar in the Exchequer, which, under certain conditions, *e.g.* constant temperature, are approximately rigid, it becomes impossible to apply your Geometry to concrete things—it is reduced to what Helmholtz mockingly calls “transcendental” as opposed to “physical” Geometry.—This objection is plausible, but I believe we can answer it. (1) In the first place, the conception of rigidity is meaningless until we have the axiom of Congruence. If mere space did not allow, in one place, a shape which it had allowed in another, we should not be able to bring our measure, unchanged, to the new place; if a body, in the passage from the first to the second place, had suffered deformation, we should not be able to estimate the extent of that deformation. Non-rigidity, in an actual body, involves the continued possibility of the old shape, together with an actual departure from it. (2) There are, as a matter of fact, no such things as perfectly rigid bodies, and yet Geometry remains. All bodies change their size with changes of temperature; some change with pressure. If the atomic theory be true, nothing *can* be rigid except the ultimate atoms. It would be odd if the most fundamental postulate of Geometry, on which all spatial measurement depends, were as a matter of fact untrue. (3) To pass to positive objections, Geometry deals, not with matter, but with space. If we admitted Helmholtz's view, the distinction between Physics and Geometry would break down. What our axiom asserts about real bodies is not that their shapes do not change, but that such changes of shape as they do undergo are due to physical, not to geometrical, causes. This makes the investigation of these physical causes possible, by the ordinary inductive methods. We can compare two bodies, first at the same temperature, then at different temperatures, and thus discover the effect of temperature on volume. But such comparison, as we have seen, is only possible by the help of the axiom of Congruence, which alone makes spatial magnitude an intelligible property of a body. What we require is not the existence of actual rigid bodies, but the axiom that bodies, *under precisely similar physical conditions*, preserve their shapes in spite of changing geometrical conditions. The platinum bar

in the Exchequer varies in size, but that does not upset our Geometry; we specify a certain temperature at which its size is to be taken, and at this temperature our axiom tells us that its length is constant, in spite of the earth's motion in space. Of course, when we apply Geometry to real bodies, an empirical element appears in the axiom, for it is only empirically and approximately that we can know the physical conditions to be the same in two cases. But geometrical shapes are not necessarily bodies—indeed bodies never have accurate geometrical shapes—and the properties of space need not be confounded with those of matter. Thus there seems no ground for giving to our axiom the untrue sense of affirming the actual existence of rigid bodies. What it does assert, at bottom, is the impossibility of absolute position, and the homogeneity of space.

There remain one or two objections to be answered. First, how do we obtain equality in solids, and in Kant's case of right and left gloves or right- and left-handed screws, where actual superposition is impossible? And second, how can we take Congruence as the only possible basis of spatial measurement, when we have before us the case of time, where no such thing as Congruence is conceivable? I will consider these objections in turn.

(1) How do we measure the equality of solids in Geometry? These could only be brought into actual congruence if we had a fourth dimension to operate in, and from what I have said before of the absolute necessity of this test, it might seem as though we should be left here in utter ignorance. Euclid is silent on the subject, and in all works on Geometry it is assumed as self-evident that two cubes of equal side are equal. This assumption suggests that we are not so badly off as we should have been without congruence as a test of equality in one and two dimensions; for now we can at least be sure that two cubes have all their sides and all their faces equal. Two such cubes differ, then, in no sensible spatial quality save position, for volume, in this case at any rate, is not a sensible quality. They are, therefore, as far as such qualities are concerned, indiscernible; if their places were interchanged, we might know the change by their colour or by some other non-geometrical property; but so far as any property of which Geometry can take cognizance is concerned, everything would seem as before. To suppose a difference of volume, then, would be to ascribe an effect to mere position, which we saw to be inadmissible while discussing congruence; except as regards position, they are geometrically indiscernible, and we may call to our aid the Identity of Indiscernibles to establish their agreement in the one remaining geometrical property of volume. This may seem

rather a strange principle to use in Mathematics, and for Geometry their equality is, perhaps, best regarded as a convention; but if we demand a philosophical ground for this convention, it is, I believe, only to be found in the Identity of Indiscernibles. Of course, as soon as we have established this one case of equality of volumes, the rest of the theory follows; as appears from the ordinary method of integrating volumes, by dividing them into small cubes.

Thus congruence *helps* to establish 3-dimensional equality, though it cannot directly *prove* such equality; and the same philosophical principle, of the homogeneity of space, by which congruence was proved, comes to our rescue here. But how about right-handed and left-handed screws? Here we can no longer apply the identity of indiscernibles, for the two are very well discernible. As with solids, so here, actual superposition would only be possible if we had a fourth dimension to operate in. But again, as with solids, so here, Congruence can help us much. It can enable us, by ordinary measurement, to show that the internal relations of both screws are the same, and that the difference lies only in their relations to other things in space. Knowing these internal relations, we can calculate, by the Geometry which Congruence has rendered possible, all the geometrical properties of these screws—radius, pitch, etc.—and can show them to be severally equal in both. But this is all we require. Mediate comparison is possible, though immediate comparison is not. Both can, for instance, be compared with the cylinder on which both would fit, and thus their equality can be proved. A precisely similar proof holds, of course, for the other cases—right and left gloves, spherical triangles, etc. On the whole, these cases confirm my argument; for they show, as Kant intended them to show, the essential relativity of space.

(2) As regards time, no Congruence is here conceivable, for to effect Congruence requires always—as we saw in the case of solids—one more dimension than belongs to the magnitudes compared. No day can be brought into temporal coincidence with any other day, to show that the two exactly cover each other; we are therefore reduced to the arbitrary assumption that some motion or set of motions, given us in experience, is uniform. Fortunately, we have a large set of motions which all roughly agree: the swing of the pendulum, the rotation and revolution of the earth and the planets, etc. These do not exactly agree, but they lead us to the laws of motion, by which we are able, on our arbitrary hypothesis, to estimate their small departures from uniformity; just as the assumption of Congruence enabled us to measure the departures of actual bodies from rigidity. But here, as there, another possibility is mathemati-

cally open to us, and can only be excluded by its philosophic absurdity; we might have assumed that the above set of approximately agreeing motions all had velocities which varied approximately as some arbitrarily assumed function of the time $f(t)$ say, measured from some arbitrary origin. Such an assumption would still keep them as nearly synchronous as before, and would give an equally possible, though more complex, system of Mechanics; instead of the first law of motion, we should have the following: A particle preserves in its state of rest, or of rectilinear motion with velocity varying as $f(t)$, except in so far as it is compelled to alter that state by the action of external forces. Such a hypothesis is mathematically possible, but, like the similar one for space, it is excluded by the fact that it involves absolute time, as a determining agent in change, whereas time can never, philosophically, be anything but a passive holder of events, abstracted from change.

I have introduced this parallel from time, not as really bearing on the argument, but as a simpler case which may serve to illustrate my reasoning in the more complex case of space. For since time, in Mathematics, is one-dimensional, the mathematical difficulties are simpler than in Geometry; and although nothing accurately corresponds to Congruence, there is a very similar mixture of mathematical and philosophical necessity, giving, finally, a thoroughly definite axiom as the basis of time-measurement, corresponding to Congruence as the basis of space-measurement¹.

(3) The case of time-measurement suggests one last objection which might be urged against the absolute necessity of the axiom of Congruence. Psychophysics has shown that we have an approximate power, by means of what may be called the sense of duration, of immediately estimating equal short times. This, it may be said, establishes a rough measure independent of any assumed uniform motion, and in space also we may be said to have a similar power of immediate comparison. We can see, by immediate inspection, that the sub-divisions on a foot-rule are not grossly inaccurate, and so, it may be said, we both have a measure independent of Congruence, and also could discover, by experience, any gross departure from Congruence. Against this view, however, there is at the outset a very fundamental psychological objection. It appears that all our comparison of spatial magnitudes proceeds by ideal superposition. Thus James says (*Psychology*, Vol. II. p. 152): "Even where we only feel one sub-division to be vaguely larger

¹ It is also important to observe that since time, in the above account, is measured by motion, its measurement presupposes that of spatial magnitudes.

or less, the mind must pass rapidly between it and the other sub-division, and receive the immediate sensible shock of the *more*," and "so far as the sub-divisions of a sense-space are to be *measured* exactly against each other, objective forms occupying one sub-division must be directly or indirectly superposed upon the other¹." Even if we waive this fundamental objection, however, others remain. To begin with, such judgments of equality are only very rough approximations, and cannot be applied to lines of more than a certain length, if only for the reason that such lines cannot well be seen together. Thus this method can only give us any security in our own immediate neighbourhood, and could in no wise warrant such operations as would be required for the construction of maps, etc., much less the measurement of astronomical distances. They might just enable us to say that some lines were longer than others, but they would leave Geometry in a position no better than that of the Hedonical Calculus, in which we depend on a purely subjective measure. So inaccurate, in fact, is such a method acknowledged to be, that the foot-rule is as much a need of daily life as of science. Besides, no one would trust such immediate judgments, but for the fact that the stricter test of Congruence to some extent confirms them; if we could not apply this test, we should have no ground for trusting them even as much as we do. Thus we should have, here, no real escape from our absolute dependence upon the axiom of Congruence.

One last elucidatory remark is necessary before our proof of the axiom of Congruence can be considered complete. We spoke, above, of the Geometry on an egg, where Congruence does not hold. What, I may be asked, is there, about a thoroughly non-Congruent Geometry, more impossible than this Geometry on the egg? The answer is obvious. The Geometry of non-congruent surfaces is *only* possible by the use of infinitesimals, and in the infinitesimal all surfaces become plane. The fundamental formula, that for the length of an infinitesimal arc, is only obtained on the assumption that such an arc may be treated as a straight line, and that Euclidean Plane Geometry may be applied in the immediate neighbourhood of any point. If we had not our Euclidean measure, which could be moved without distortion, we should have no method of comparing small arcs in different places, and the Geometry of non-congruent surfaces would break down. Thus the axiom of Congruence, as regards three-dimensional space, is necessarily implied and presupposed in the Geometry of non-congruent

¹ Cp. Stumpf, *Ursprung der Raumvorstellung*, p. 68.

surfaces; the possibility of the latter, therefore, is a dependent and derivative possibility, and can form no argument against the *a priori* necessity of Congruence.

It is to be observed that the axiom of Congruence or Free Mobility, as I have enunciated it, includes also the axiom to which Helmholtz gives the name of Monodromy. This asserts that a body does not alter its dimensions in consequence of a complete revolution through four right angles, but occupies at the end the same position as at the beginning. On the mathematical necessity of making a separate axiom of this property of space, there is disagreement among experts; philosophically it is plainly a particular case of Congruence¹ and indeed a particularly obvious case, for a translation really does make some change in a body, namely a change in position, but a rotation through four right angles may be supposed to have been performed any number of times without appearing in the result, and the absurdity of ascribing to space the power of making bodies grow in the process is palpable; everything that was said above on Congruence in general applies with even greater evidence to this special case.

To sum up: the axiom of Free Mobility contains whatever is geometrical in the so-called arithmetical axioms, as well as Euclid's 8th axiom. It supplies a measure of spatial equality for lines, surfaces and angles, and so of spatial magnitude in general, but this is *geometrically* not the only possible way of supplying such a measure. We might suppose that all geometrical figures varied their shapes and sizes in any assumed definite way, so that, say, an elementary line, whose length in a standard position was ds , became, in the position p of a length $ds.F(p)$. As, however, the position p could only be defined by the lengths of its coordinates, and these lengths could only be discovered by means of the above assumed law, the law could never be either proved or disproved by Geometry, and would, therefore, be of the nature of an arbitrary convention. This being so, it is open to us, without danger to the validity of Geometry, to choose any form for $f(p)$ which may be convenient; we may therefore make $f(p)$ a constant, unity, by which means we reduce the above axiom to that of Congruence. But when we pass to the philosophical point of view, it appears that the axiom flows from the general principle of the passivity of mere space in relation to objects, so that philosophically it is more than a convention; it is even necessary *a priori*, and non-Euclidean systems (with the

¹ As is Helmholtz's other axiom, that the possibility of superposition is independent of the course pursued in bringing it about.

apparent exception of Cayley's) do not, as a matter of fact, ever dispense with it.

II. *The Axiom of Dimensions.*

We have seen, in discussing the axiom of Congruence, that all position is relative, that is, a position exists only by virtue of relations¹. It follows that, if positions can be defined at all, they must be uniquely and exhaustively described by some finite number of such relations. If Geometry is to be possible, it must happen that, after enough relations have been given to determine a point uniquely, its relation to any fresh known point must be deducible from the relations already given. Hence we obtain, as an *a priori* condition of Geometry, logically indispensable to its existence, the axiom that *Space must have a finite integral number of Dimensions*. For every relation required in the definition of a point constitutes a dimension, and a fraction of a relation is meaningless. The number of relations required must be finite, for an infinite number of dimensions would be practically impossible to determine. If we remember our axiom of Congruence, and remember also that space is a continuum, we may state our axiom in the form given by Helmholtz: "In a space of n dimensions the position of a point is uniquely determined by the measurement of n continuous independent variables (coordinates)²."

So much, then, is *a priori* necessary to Geometry. The restriction of the dimensions to three seems, on the contrary, to be wholly the work of experience. This restriction cannot be logically necessary, for as soon as we have formulated any analytical system, it appears wholly arbitrary. Why, we are driven to ask, cannot we add a fourth coordinate to our x, y, z , or give a geometrical meaning to x^4 ? In this more special form, we are tempted to regard the axiom of dimensions, like the number of inhabitants of a town, as a purely statistical fact, with no greater necessity than such facts have.

Geometry affords intrinsic evidence of the truth of my division of the axiom of dimensions into an *a priori* and empirical portion. For the extension of the number of dimensions to four, or to n , alters nothing in plane and solid Geometry, but only

¹ The question "Relations to what?" is a question involving many difficulties. It will be touched on later in this article, but can only be answered by abandoning the purely geometrical standpoint. For the present, in spite of the glaring circle involved, I shall take the relations as relations to other positions.

² *Wiss. Abh.* Bd. II. S. 614.

adds new branches which interfere in no way with the old; but *some* definite number of dimensions is assumed in all Geometries, nor is it possible to conceive of a Geometry which should be free from this assumption.

Let us, since the point seems of some interest, and has, to my knowledge, never been noticed before, repeat our proof of the apriority of this axiom from a slightly different point of view. We will begin, this time, from the most abstract conception of space, such as we find in Riemann's dissertation. We have, here, an ordered manifold, infinitely divisible and allowing of free mobility. Free mobility involves, as we saw, the power of passing continuously from any one point to any other, by any course which may seem pleasant to us; it involves, also, that, in such a course, no changes occur except changes of mere position; *i.e.* positions do not differ from one another in any qualitative way. (This absence of qualitative difference is the distinguishing mark of space as opposed to other manifolds, such as the colour- and tone-systems; in these, every element has a definite qualitative sensational value, whereas, in space, the sensational value of a position depends wholly on its relation to our own body, and is thus not intrinsic, but relative.) From the absence of qualitative differences among positions, it follows logically that positions exist only by virtue of other positions; one position differs from another just because they are two, not because of anything intrinsic in either. Position is thus defined simply and solely by relation to other positions. Any position, therefore, is completely defined when, and only when, enough such relations have been given to enable us to determine its relation to any new position, this new position being defined by the same number of relations. Now in order that such definition may be at all possible, a finite number of relations must suffice. But every such relation constitutes a dimension. Therefore, if Geometry is to be possible, it is *a priori* necessary that space should have a finite integral number of dimensions.

The limitation of the dimensions to three is, as we have seen, empirical; nevertheless, it is not liable to the inaccuracy and uncertainty which usually belong to empirical knowledge. For the alternatives which logic leaves to sense are discrete—if the dimensions are not three, they must be two or four or some other number—so that *small* errors are out of the question. Hence the final certainty of the axiom of three dimensions, though in part due to experience, is of quite a different order from that of (say) the law of Gravitation. In the latter, a small inaccuracy might exist and remain undetected; in the former, an error would have to be so considerable as to be utterly

impossible to overlook. It follows that the certainty of our whole axiom is almost as great as that of the *a priori* element, since this element leaves to sense a definite disjunction of discrete possibilities.

III. *The Straight Line.* I have hitherto spoken of relations between points as though the meaning of such relations were self-evident; I have spoken, also, of distances and magnitudes as though these were terms which any one might use unchallenged. The time has now come to examine more minutely into these assumptions.

First of all, what is the relation between two points? The answer seems evident: the relation is their distance apart. Well and good: but how is their distance to be measured? It must be measured by some curve which joins the two points, and if it is to have a unique value, it must be measured by a curve which those two points completely define. But such a curve is a straight line, for a straight line is the only curve determined by any two of its points. Hence, *if two points are to have to each other a determinate relation, without reference to any other point or figure in space, space must allow of curves uniquely determined by any two of their points, i.e. of straight lines.*

This is the axiom of the straight line; but we cannot regard the *a priori* certainty of this axiom as established by so summary an argument. In the first place, our axiom is as yet hypothetical—we have still to discuss whether it is logically possible for the relation between two points to be dependent on the rest of space, or on some part of the rest of space. If this possibility is successfully disposed of, it remains to show, more rigidly than above, that the relation between two points can only have a unique value if it is measured by a curve which those two points completely define. In short, we shall have to consider the conditions for the measurement of distance. Here we shall have a very formidable difficulty in spherical Geometry, which may compel us somewhat to modify our axiom. In the course of the discussion, it will appear that points have no meaning apart from lines, nor lines apart from points; thus our definition of the straight line will become circular, and we shall be forced to admit the necessity of some extra-geometrical aid in framing our idea of the straight line.

(1) What warrant have we for supposing that two points must have to each other a determinate relation, independent of the rest of space? Our argument is already rather risky, since we have said that points can only be determined by their relations to other points, and these others by relations to fresh points, and so on *ad infinitum*. This procedure involves either

a circle or an infinite regress¹, either of which is a logical fallacy, which we are not yet in a position to resolve. Hence our reasoning, as resting on this fallacy, is necessarily rather precarious. Nevertheless, we will see what is to be said.

Our great resource, here as always, is the homogeneity of space. It is plain that any two points must have *some* relation to each other, and it follows from the homogeneity of space that two points having the same relation can be constructed in any other part of space. Using the axiom of Free Mobility, we may express this fact thus: The figure formed of the two points can be moved about in space, in any way we choose, without being altered in any way. Consequently, the relation between the two points cannot be altered by motion. But, if that relation were in any way dependent on the position of the two points in space, it would necessarily be altered by change of position. Now relation to other figures in space means nothing but position, or some factor in the determination of position, and is thus necessarily altered by motion². It follows that the relation between the two points, being unaltered by motion, must be independent of the rest of space. Thus two points have to each other a definite relation, uniquely determined by those two points.

But why, it may be asked, should there be only one such relation between two points? Why not several? The answer to this lies in the fact that points are wholly constituted by relations, and have no intrinsic nature of their own. A point is defined by its relations to other points, and when once the relations necessary for definition have been given, no fresh relations to the points used in definition are possible, since the point defined has no qualities from which such relations could flow. Now one relation to any one other point is as good for definition as more would be, since however many we had, they would all remain unaltered in a motion of both points. Hence there can only be one relation determined by any two points.

(2) We have thus disposed of the first objection—two points have one and only one relation uniquely determined by those two points. This relation we call their distance apart. It remains to consider the conditions of the measurement of

¹ Corresponding to the two possibilities of infinite, and of finite but unbounded space.

² It may be objected that, if the relation were, for instance, distance from some plane, motion parallel to that plane would not alter the relation. But the axiom of Free Mobility admits of no exceptions, so that the motion of the two points cannot be restricted to motion parallel to that plane. Motion of a general kind will alter any external relation of the figure moved.

distance, *i.e.* how far a unique value for distance involves a curve uniquely determined by the two points.

We are accustomed to the definition of the straight line as the *shortest* distance between two points, which implies that distance might equally well be measured by curved lines. This implication I believe to be false, for the following reasons. When we speak of the length of a curve, we can give a meaning to our words only by supposing the curve divided into infinitesimal rectilinear arcs, whose sum gives the length of an equivalent straight line; thus, unless we presuppose the straight line, we have no means of comparing the lengths of different curves, and can therefore never discover the applicability of our definition. It might be thought, perhaps, that some other line, say a circle, might be used as the basis of measurement. But in order to estimate in this way the length of any curve other than a circle, we should have to divide the curve into infinitesimal circular arcs. Now two successive points do not determine a circle, so that an arc of two points would have an indeterminate length. It is true that, if we exclude infinitesimal radii for the measuring circles, the lengths of the infinitesimal arcs would be determinate, even if the circles varied, but that is only because all the small circular arcs through two consecutive points coincide with the straight line through those two points. Thus, even with the help of the arbitrary restriction to a finite radius, all that happens is that we are brought back to the straight line. If, to mend matters, we take *three* consecutive points of our curve, and reckon distance by the arc of the circle of curvature, the notion of distance loses its fundamental property of being a relation between *two* points. For two consecutive points of the arc could not then be said to have any corresponding distance apart—three points would be necessary before the notion of distance became applicable. Thus the circle is not a possible basis for measurement, and similar objections apply, of course, with increased force, to any other curve. All this argument is designed to show, in detail, the logical impossibility of measuring distance by any curve not completely defined by the two points whose distance apart is required. If in the above we had taken distance as measured by circles *of given radius*, we should have introduced into its definition a relation to other points besides the two whose distance was to be measured, which we saw to be a logical fallacy. Besides, how are we to know that all the circles have equal radii, until we have an independent measure of distance?

A straight line, then, is not the *shortest* distance, but it is simply *the* distance between two points—so far, this conclusion

has stood firm. But suppose we had two or more curves through two points, and that all these curves were congruent *inter se*. We should then say, in accordance with the axiom of Congruence, that the lengths of all these curves were equal. Now it might happen that, although no one of the curves was uniquely determined by the two end-points, yet the common length of all the curves was so determined. In this case, what would hinder us from calling this common length the distance apart, although no unique figure in space corresponded to it? This is the case contemplated by spherical Geometry, where, as on a sphere, antipodes can be joined by an infinite number of geodesics, all of which are of equal length. The difficulty supposed is, therefore, not a purely imaginary one, but one which modern Geometry forces us to face. I shall consequently discuss it at some length.

To begin with, I must point out that my axiom is not quite equivalent to Euclid's. Euclid's axiom states that two straight lines cannot enclose a space, *i.e.* cannot have more than one common point. Now if every two points, without exception, determine a unique straight line, it follows, of course, that two different straight lines can have only one point in common—so far, the two axioms are equivalent. But it may happen, as in Spherical Space, that two points *in general* determine a unique straight line, but fail to do so when they have to each other the special relation of being antipodes. In such a system, every pair of straight lines in the same plane meet in two points, which are each other's antipodes; but two points, *in general*, still determine a unique straight line¹. We are still able, therefore, to obtain distances from unique straight lines, except in limiting cases; and in such cases, we can take any point intermediate between the two antipodes, join it by the *same* straight line to both antipodes, and measure its distances from those antipodes in the usual way. The sum of these distances then gives a unique value for the distance between the antipodes.

Thus, even in spherical space, we are greatly assisted by the axiom of the straight line; all linear measurement is effected by it, and exceptional cases can be treated, through its help, by the usual methods for limits. Spherical space, therefore, is not so adverse as it at first appeared to be to the *a priori* necessity of the axiom. Nevertheless we have, so far, not attacked

¹ The distinction, in metageometry, between positive and negative space-constant does not lie, as is generally supposed, in the validity of the axiom of the straight line. For Klein has shown that in elliptic space, which also has positive space-constant, the axiom holds without exception.

the kernel of the objection which spherical space suggested. To this attack it is now our duty to proceed.

It will be remembered that, in our *a priori* proof that two points must have one definite relation, we held it impossible for those two points to have, to the rest of space, any relation which would be unaltered by motion. Now in spherical space, in the particular case where the two points are antipodes, they *have* a relation, unaltered by motion, to the rest of space—the relation, namely, that their distance is half the circumference of the universe. In our former discussion, we assumed that any relation to outside space must be a relation of position—and a relation of position must be altered by motion. But with a finite space, in which we have absolute magnitude, another relation becomes possible, namely, a relation of magnitude. Antipodal points, accordingly, like coincident points, no longer determine a unique straight line. And it is instructive to observe that there is, in consequence, an ambiguity in the expression for distance, like the ordinary ambiguity in angular measurement. If k be the space-constant, and d be one value for the distance between two points, $2\pi kn \pm d$, where n is any integer, is an equally good value. Distance is, in short, a periodic function like angle. Whether or not such a system is philosophically permissible, I shall consider later—for the present, I am content to point out that such a state of things rather confirms than destroys my contention that distance depends on a curve uniquely determined by two points. For as soon as we drop this unique determination, we see ambiguities creeping into our expression for distance. Distance still has a set of discrete values, corresponding to the fact that, given one point, the straight line is uniquely determined for all other points but one, the antipodal point. It is tempting to go on, and say: If through *every* pair of points there were an infinite number of the curves used in measuring distance, distance would be able, for the same pair of points, to take, not only a discrete series, but an infinite *continuous* series, of values.

This, however, is mere speculation. I come now to the *pièce de résistance* of my argument. The ambiguity, in spherical space, arose, as we saw, from a relation of *magnitude* to the rest of space—such a relation being unaltered by motion of the two points, and therefore falling outside our introductory reasoning. But what is this relation of magnitude? Simply a relation of the *distance* between the two points to a *distance* given in the nature of the space in question. It follows that such a relation *presupposes* a measure of distance, and need not, therefore, be contemplated in any argument which deals with the *a priori* requisites for the possibility of definite distances.

I have now shown, I hope conclusively, that spherical space affords no objection to the apriority of my axiom. Any two points have one relation, their distance, which is independent of the rest of space, and this relation requires, as its measure, a curve uniquely determined by those two points. I might have taken the bull by the horns, and said: Two points *can* have no relation but what is given by lines which join them, and therefore, if they have a relation independent of the rest of space, there must be one line joining them which they completely determine. Thus James says¹:

"Just as, in the field of quantity, the relation between two numbers is another number, so *in the field of space the relations are facts of the same order with the facts they relate...* When we speak of the relation of direction of two points toward each other, we mean simply the sensation (?) of the line that joins the two points together. *The line is the relation....The relation of position between the top and bottom points of a vertical line is that line, and nothing else.*"

If I had been willing to use this doctrine at the beginning, I might have avoided all discussion. A unique relation between two points *must*, in this case, involve a unique line between them. But it seemed better to avoid a doctrine not universally accepted, the more so as I was approaching the question from the logical, not the psychological, side. After disposing of the objections, however, it is interesting to find this confirmation of the above theory from so different a standpoint. Indeed, I believe James's doctrine could be proved to be a logical necessity, as well as a psychological fact. For what sort of thing can a spatial relation between two distinct points be? It must be something spatial, and it must be something which somehow bridges the gulf of their disparateness. It must be something at least as real and tangible as the points it relates, since we saw that points are wholly constituted by their relations. There seems nothing which can satisfy all these requirements, except a line joining them. Hence, once more, a unique relation must involve a unique line. That is, linear magnitude is logically impossible, unless space allows of curves uniquely determined by any two of their points.

To sum up: If points are defined simply by relations to other points, *i.e.* if all position is relative, every point must have to every other point one, and only one, relation independent of the rest of space. This relation is the distance between the two points. Now a relation between two points can only be defined by a line joining them—nay further, it may

¹ *Psychology*, Vol. II. pp. 149-150.

be contended that a relation can only *be* a line joining them. Hence a unique relation involves a unique line, *i.e.* a line determined by any two of its points. Only in a space which admits of such a line is linear magnitude a logically possible conception. But, when once we have established the possibility, in general, of drawing such lines, and therefore of measuring linear magnitudes, we may find that a certain magnitude has a peculiar relation to the constitution of space. The straight line may turn out to be of finite length, and in this case its length will give a certain peculiar linear magnitude, the space-constant. Two antipodal points, that is, points which bisect the entire straight line, will then have a relation of magnitude which, though unaltered by motion, is rendered peculiar by a certain constant relation to the rest of space. This peculiarity presupposes a measure of linear magnitude in general, and cannot therefore upset the apriority of the axiom of the straight line. But it destroys, for points having the peculiar antipodal relation to each other, the argument which proved that the relation between two points could not, since it was unchanged by motion, have reference to the rest of space. Thus it is intelligible that, for such special points, the axiom breaks down, and an infinite number of straight lines are possible between them; but unless we had started with assuming the general validity of the axiom, we could never have reached a position in which antipodal points could have been known to be peculiar, or indeed any position which would enable us to give any definition whatever of particular points.

In connection with the straight line, it will be convenient to say a few words about the logical conditions of the possibility of a coordinate system. Much recent Geometry, more especially that of Cayley and Klein, begins, if I have understood it aright, by presupposing a coordinate system, without considering whether the axioms set forth at the start are sufficient to make such a system possible. I am going to contend, here, that no system of coordinates can be set up without presupposing the straight line as the measure of distance. Cayley and Klein begin with coordinates, and proceed to *define* distance, more or less arbitrarily, as a function of coordinates; this is, I think, a logical fallacy, as I shall now attempt to prove.

In the first place, a point's coordinates constitute a complete definition of it; now a point can only be defined, as we have seen, by its relations to other points, and these relations can only be defined by means of the straight line. Consequently, any system of coordinates must involve the straight line, as the basis of its definitions of points.

This *a priori* argument, however, though I believe it to be quite sound, is not likely to carry conviction to any one persuaded of the opposite. Let us, therefore, examine co-ordinate systems in detail, and show, in each case, their dependence on the straight line.

We have already seen that the notion of distance involves the straight line. We cannot, therefore, define our coordinates in any of the ordinary ways, as the distances from three planes, lines, points, spheres, or what not. Polar coordinates are impossible, since—waiving the straightness of the radius vector—the length of the radius vector becomes unmeaning. Von Standt's projective construction¹ proceeds entirely by the help of straight lines. Triangular coordinates involve not only angles, which must in the limit be rectilinear, but straight lines, or at any rate some well-defined curves. Now curves can only be defined in two ways: either by relation to the straight line, as *e.g.* by the curvature at any point, or by purely analytical equations, which presuppose an intelligible system of coordinates. What methods remain for assigning these arbitrary values to different points? Nay, how are we to get any estimate of the difference—to avoid the more special notion of distance—between two points? The very notion of a point has become illusory. When we have a coordinate system, we may define a point by its three coordinates; in the absence of such a system, we may define the notion of point *in general* as the intersection of three surfaces or of two curves. Here we take surfaces and curves as notions which intuition makes plain, but if we wish them to give us a precise numerical definition of *particular* points, we must specify the kind of surface or curve to be used. Now this, as we have seen, is only possible when we presuppose either the straight line, or a coordinate system.—It follows that every coordinate system presupposes the straight line, and is logically impossible without it.

I may point out, as a corollary, that the straight line cannot be defined as a curve of the first degree, since this involves a coordinate system. When we have the straight line, it follows from its definition—as a curve determined by two points—that its equation will be of the first degree, but to give this property as a definition is to put the cart before the horse.

The above discussion has shewn, particularly in treating of coordinate systems, that points can only be defined by the help of the straight line. But we have defined the straight line as a curve determined by two points. Our logic is therefore

¹ v. Klein, *Nicht-Euklid.*, I. p. 338 ff.

circular, and—unless an error has crept into our reasoning—it is *necessarily* circular. This fact is a warning that we have exhausted the powers of geometrical logic, and must turn for aid to something more concrete and self-subsistent than geometrical space¹.

Before ending this paper, let us briefly sum up the argument we have just concluded. Geometry, as we defined it in the beginning, deals with spatial magnitudes and their relations, while measurement may be defined as the comparison of any magnitude with a unit of its own kind. Starting from these definitions, we saw that all geometry may be regarded as spatial measurement, mediate or immediate. Accordingly it is *a priori* necessary, if Geometry is to be logically possible, that space should be such as to render possible (subject to the inevitable errors of observation) accurate and unequivocal measurement of spatial magnitudes. The whole task of our chapter has been, accordingly, to find the necessary and sufficient conditions of such measurement. We found, first, since spatial magnitudes are given, to begin with, in different places, that comparison of them will only be possible if they are unaltered by the motion necessary for superposition. This led to the Axiom of Free Mobility, which turned out to be equivalent to the homogeneity of space, or, as it may be called, the complete relativity of position.

We then saw that position, being relative, must be defined—if it can be defined at all—by some definite number of relations. Each of these relations constitutes a dimension, so that we obtain the axiom: Space must have a finite integral number of dimensions.

The above definition of dimensions, as the relations necessary to define positions, or points, led naturally to the enquiry: What sort of relations are they which define our points and constitute our dimensions? We found that any relation between two points was measured by—nay, actually

¹ Throughout the above discussions, I have freely used the postulate of Infinite Divisibility. This has sometimes been supposed to involve difficulties, though I have never been able to feel their force. Of course the postulate applies only to the *conception* of space, not to the intuition—as regards the latter, Hume's contentions as to the *minimum sensible* remain perfectly valid. But the conception of space is that of a continuum, and I am unable to see how a continuum can be other than infinitely divisible. Moreover, the very essence of space, as conceived by Geometry, is relativity and mutual externality of parts, which makes the notion of an atomic unit of finite extension particularly preposterous. Such a limit to divisibility is open to the same objections as a boundary to space—it assigns a reality and power to empty space, such as it cannot conceivably have. On this postulate, therefore, I have no more to say. It seems to me unimpeachable and wholly *a priori*.

was—some curve between those points. We found that our need of relations adequate to definition could only be satisfied if two points had, *in general*, a unique relation, called distance, defined by a curve which the two points uniquely determined. This curve is the straight line. In our proof of the necessity of such a relation, however, we supposed that, so far, we had no measure of distance; when the straight line has enabled us to establish distance for every *general* point-pair, we may find one distance bound up in the nature of space. Corresponding to this distance, the curve defining the relation of a point-pair *may* not be unique. This argument, however, only shows a logical possibility—it remains for special mathematics to discuss when or how it is realized.

With the above axioms, we have, I think, all that is *a priori* necessary to the establishment of a Geometry. A Geometry using no axioms but the above will be wholly *a priori*, taking nothing from experience but the one fundamental property of space, that points and positions have not an intrinsic, but only a relative nature. This is the quality which distinguishes space from any other manifold—in the colour and tone-systems, every element has an intrinsic nature, sensationally given, from which the relations between the elements are intellectually constructed. In space, on the contrary, the relations also are sensationally given, and the elements (points) are never given except as terms in a relation. We may then state the problem we have been dealing with above in the following form: Given a manifold in which the elements have not an intrinsic, but only a relative being, what postulates are *a priori* necessary for its exact quantitative treatment? The postulates required have turned out, as might have been expected, to be exactly those which Euclid and the Pangeometers have in common. The axiom of parallels, the three dimensions, and the axiom of the straight line in the more special form given by Euclid, have not been found to be logically inevitable. These, then, may be supposed to derive their evidence from intuition. Finally, the postulate from which the whole discussion started, the relativity of position, made it impossible to avoid circles in our definitions: points could only be defined by lines, and lines by points. Thus, even in the *a priori* part of Geometry, we have a space which cannot stand by itself, a thing all relations, without any kernel of thinghood to which the relations can be attached. This forces us to attempt a resolution of the contradiction by abandoning the purely geometrical standpoint; but such an attempt would fall outside the limits of the present paper, and would only be possible on the basis of a general metaphysic.

II.—SENSE, MEANING AND INTERPRETATION. (I)

BY V. WELBY.

THE drawbacks and even dangers of linguistic ambiguity and obscurity have always been more or less recognised and deplored, and most of us have exhorted others and have been ourselves exhorted to be clear and definite in statement and exposition, and not to wander from the 'plain meaning' or the 'obvious sense' of the words which we might have occasion to use. For it is undeniable that obscurity or confusion in language, if it does not betray the same defect in thought, at least tends to create it. The clearest thinking in the world could hardly fail to suffer if *e.g.* an Englishman could only express it in broken Chinese.

But when we ask what authority is to be appealed to in order to settle such meaning or sense, and how we are to avoid ambiguity and obscurity: when we ask how we are always to be 'clear' for all hearers or readers alike under all circumstances: when we ask where we may obtain some training not only in the difficult art of conveying our own meaning, but also in that of interpreting the meaning of others: when further we inquire into the genesis of sign, symbol, mark, emblem, &c. and would learn how far their 'message' must always be ambiguous or may become more adequately representative and more accurately suggestive, then the only answers as yet obtainable are strangely meagre and inconsistent. And they can hardly be otherwise so long as no serious attention, still less study, is given to the important ideas which we vaguely and almost at random convey by 'sense,' 'meaning,' and allied terms, or to that process of 'interpretation' which might perhaps be held to include attention, discrimination, perception, interest, inference and judgment, but is certainly both distinct from, and as important as, any of these.

The question where the interpreting function begins: where any stimulus may be said to suggest, indicate or signalise

somewhat other than itself, is already to some extent a question of Meaning,—of the *sense* in which we use the very word. In one sense, the first thing which the living organism has to do,—beginning even with the plant—is to interpret an excitation and thus to discriminate between the appeals *e.g.* of food and danger. The lack of this power is avenged by elimination. From this point of view, therefore, the problem which every root as well as the tentacle and even the protozoic surface may be said to solve is that of ‘meaning,’ which thus applies in unbroken gradation and in ever-rising scale of value, from the lowest moment of life to the highest moment of mind.

But ‘meaning,’ one of the most important of our conceptions and indeed that on which the value of all thought necessarily depends, strangely remains for us a virtually unstudied subject. We are content to suppose it vaguely equivalent to ‘significance’ or to ideas expressed by a long list of so-called synonyms, never used with any attempt to utilise the distinctions of idea which they may embody, and which inquiry might show to be of real value in disentangling the intricacies and avoiding the pitfalls of philosophic thought. For example, for the purposes of such inquiry some of the main lines of thought might be tentatively correlated with the meaning-terms which seem more especially to belong to them; and this would at least help us to understand that we are not to demand of any one what more properly belongs to another.

The following attempt at such a classification is of course only a suggestion of what is here intended (*i.e.* meant):—

Philology and Signification	} Meaning (or Intent ?)
Logic and Import	
Science and Sense	
Philosophy	
Poetry	
Religion	} and Significance

It is evident that the questions here opened are too wide to be adequately dealt with in an Article; but it may be possible briefly to suggest the kind of advantage which might accrue from the direction of attention to this subject.

Signification here represents the value of language itself: it seems naturally concerned with words and phrases, and is generally confined to them, although the numerous exceptions show that the distinction is not clearly recognised.

Import, on the other hand, introduces us to the idea of ‘importance’ and marks the intellectual character of the logical process. When we speak of the import of propositions, we are thinking of more than bare linguistic value: and we may find

that to master such 'import' has a real 'importance' with reference to the subtle dangers of fallacy.

In coupling *sense* with physical science, three main current senses of the word should be borne in mind. There must certainly be some 'sense' both as meaning and as judgment in observation and experiment to give them any value whatever, as our use of 'the senseless' testifies, while the word is perhaps freer from any speculative taint than even 'meaning.' But in another 'sense,' Sense is the inevitable starting-point and ultimate test of scientific generalisation, and this suggests the question whether these divers senses of the word 'sense' are independent: whether the fact of the one word being used to convey what are now quite different ideas is merely accidental, or whether it points to a very close original connection between the ideas, if not to their actual identity. There seems at least a strong presumption in favour of the latter alternative: since the divergence of the senses of 'sense' has been a comparatively recent development and is thus possible to trace. And we have the authority of Dr Murray¹, as I believe of

¹ I am allowed to quote the following passages from a private letter from Dr Murray:—

"*Sensus* became in common Romanic *senso* (retained in Italian, Portuguese), which again became in French *sens*. From French we took *sens* into English, so spelling it at first; then, to prevent the final *s* being treated as a *z* as the plurals in *pens, hens, dens*, it was written *sence* (as in fence, hence, defence, offence, &c.), and finally, with the feeling of keeping it as like the Latin as possible, and thus 'showing the etymology,' *sence*.....Etymologically, *sensus* is the *u*-stem verbal substantive of *sentire*, to discern by the senses, to feel, see, hear, taste, or smell,—the general word expressing the operation of a sense-organ in acquainting us with external objects. We have no such general word in English, though *find*, and *feel*, have both been and still.....are extended beyond the faculty of touch, to include smell, and sometimes taste; *perceive* is probably the nearest English word. But *sentire* is also extended to the inner or mental perception, to perceive, be conscious, operate mentally, '*think*.' Hence, *sensus* meant primarily the operation of one of the bodily senses, the action or faculty of feeling, smelling, tasting, hearing, seeing, physical perception.

By the (partial) objectivizing of these faculties, it came to mean (2) what we call 'a sense,' one of the five senses; thus, '*quod neque oculis neque auribus neque ullo sensu percipi potest*': what can be perceived neither by the eyes, nor by the ears, nor by any sense.

Then (3) it meant the act of conscious or mental perception, the perception of the mind or man himself, as effected by the instrumentality of a bodily sense (as when I feel a body in the dark, and thereby internally 'feel' or 'perceive' that some body is present), or of several bodily senses combined.

Then (4) the action of the mind or inner man generally, thought, feeling as to things known, opinion, view taken, &c.

Then (5) especially, the common or ordinary feeling or view of humanity in regard to any matter, or to matters in general, the 'common feeling or sense' of mankind as to what is true, proper, wise, or the con-

philologists in general, for this view. If admitted, the fact is a pregnant one, as we may see when the subject can be treated more fully. Here we may perhaps note that the word seems to give us the link between the sensory, the sensible and the significant: there is apparently a real connection between the 'sense'—say of sight—in which we react to stimulus, and the 'sense' in which we speak or act.

Meanwhile the idea of *significance* stands on a different footing from the other meaning-terms. It will hardly be denied that it has or may have an implication both of importance and special interest or value which is completely lacking not only to 'signification,' but also to 'import,' in spite of the verbal connection of this last with 'importance'; and to 'sense' in spite of its wider application. We naturally lay stress on the significance of some fact or event like the French Revolution or the Sino-Japanese war, when we feel that its 'import,' its 'sense,'—even its 'meaning'—are quite inadequate to express its effect on our minds, while it would not occur to any one to speak of its 'signification.' It has 'significance,' it is 'significant,' because it indicates, implies, involves, (or may entail) great changes or momentous issues: because it demands serious attention and, it may be, decisive action: or because it must modify more or less profoundly our mental attitude towards the nations or races affected by it, and towards the problems called social.

This applies still more in the case of the great provinces of thought we call philosophy, poetry and religion, as the ideas belonging to these pre-eminently possess that kind of value best expressed by 'significance.' And if we say that philology or logic or physical science may also claim significance, it is in virtue of these 'knowledges' possessing some at least of the

trary. In this, an individual man may share more or less largely, and is said to have *more* or *less* *sense* accordingly: the justifiable assumption being that 'the great soul of mankind is just,' and that consequently the more a man is a man of sense, *i.e.* possessed of a large share of the common feeling, views, or sense of humanity, the more he is to be valued.

But (6) the feeling, view, or thought, that a man or men have in regard to anything, is expressible in words: the words convey the sense of the speaker: we gather his sense from his words, and naturally call it the sense of the words, *i.e.* the sense conveyed by the words (as we call the water conveyed by an aqueduct 'aqueduct water,' or a letter conveyed by a ship 'a ship letter'). Hence the meaning expressed by any sentence is its sense; and by very natural and necessary extension the meaning expressed by any single word is its sense. This was fully developed already by the late Latin grammarians and rhetoricians: thus Quintilian, '*verba duos sensus significantia*' = (ambiguous) words expressing two *senses* or meanings. It is hardly popular or plebeian English yet: the man in the street would speak of the *sense* of a sentence or statement, but usually of the *meaning* of a single word. But he might in reference to a badly written word say he 'could make no sense of it.'"

higher value which the word has come to imply: it is in virtue of their special emotional or moral interest either for all intelligent minds or for special groups of these.

Besides the sense-terms already instanced, there are of course many others. We have purport, reference, acceptation, bearing, indication, implication: we speak of expressing, symbolising, standing for, marking out, signalling, designating, suggesting, betokening, portending: words or phrases (and also gestures or actions) are intelligible, descriptive, definitive, emblematic: they are used to this 'effect,' to that 'purpose,' in this 'sense,' or in that 'intent.' All these and many others come in ordinary usage under the general term 'meaning': it remains to consider the claim of Meaning to cover more ground than Sense, and to stand therefore for all those conceptions which are expressed by the words commonly used as its synonyms. In the first place we must not forget that import (or purport) is really the secondary sense of the word Meaning: and that when we say we 'mean' to do this and that (*i.e.* we intend to do it) we are using it in its primary sense. It therefore becomes, like the various senses of 'sense,' an interesting subject for inquiry how the idea of intention has here given way to the idea of sense; because there certainly does not seem at first sight to be any close connection between the 'intention' which implies volition and looks to the future, and the 'meaning' which has no direct reference to either. On the other hand, when we say 'it is my intention to do this or that' we may use as an alternative 'it is my purpose to do it': and does not that bring us to a teleological value? If so, may the link be found in the idea of End? If we organise some expedition and charter means of transport and supplies, our meaning in all this is the furtherance of the object of such expedition: all our actions have reference to this end, which is the point and only 'sense' of our exertions.

We have thus linked Intention, Meaning and End. The fact that Meaning includes Intention and End seems to indicate that it is the most general term we have for the value of a sign, symbol, or mark. And yet it is precisely Meaning which has given rise to the denotative *v.* connotative controversy and which some logicians would deny to the 'proper name.' Of this it need only at present be remarked that if the latter view is to prevail, the logical use in narrowing the sense of 'meaning' will traverse the popular one, thus tending to create confusion unless we can bring another term into use in its place; while it would seem that all needed purpose would be served by admitting that the proper name, being a sign, is *literally* significant, *i.e.* has meaning, but is neither descriptive nor definable.

What exactly then is the point to which I am venturing to

call the attention of scholars, thinkers, teachers? The very fact of the need and the lack of this attention makes a succinct answer which shall really be an answer, difficult if not even impossible. But we may provisionally express it as being, in the first place, the universal and strange neglect to master and teach the conditions of what is called, as vaguely in scientific as in philosophical writing, Sense, Meaning, Import, Significance, etc. with the conditions of its Interpretation, and in the second place the advantages, direct and indirect, present and future, of a systematic inquiry into the subject, and of its introduction from the first into all mental training.

This is emphatically more than a merely linguistic question, and it has more than even a logical or psychological value. But even if this were doubted, no one would deny that modes of expression tend both to reveal and to modify modes of thought; and this must be especially true in any attempt to make language express more perfectly, and thus enable thought to signify more and to interpret more. From this point of view we ought properly therefore to begin our quest from the linguistic stand-point, since a word *quâ* word is a meaning-sign, and thus the so-called question of words is really a question of sense. It is not too much to say, though the fact seems little realised, that it is largely through the very instinct which prompts even the most futile 'verbal' dispute that language has gained that degree of efficiency which it already possesses. But it seems impossible here to enter satisfactorily upon this side of the question, which must thus wait for a more general recognition of the importance of the whole subject.

To take an instance of the increased power of discrimination which we might hope to gain if attention could be effectually roused on this subject, we may point to the many derivative forms of (bodily) sense, all of which are in fact used with consistency and clearness. We have *e.g.* the sensory, the sensible, the sensuous, the sensual, the sensitive; but all these have exclusive reference to the *feeling*-sense of sense¹. Again, we

¹ It is difficult for the student of meaning-sense not to look with an envious eye at the wealth of idea which the organic-sense derivatives enable us to express with such precision. But for the increased confusion which a double usage would entail, we might gladly avail ourselves of the whole list, for they would immensely facilitate the discussion of questions of meaning-sense. At least however we might be allowed to coin a new derivative and speak of 'sensal' where we often now speak of 'verbal' questions, to the loss of a valuable distinction. For the use of 'verbal' ought surely to be confined to the spheres of philology or literary style, whereas 'sensal' would mark the difference between mere 'sense' (as meaning) and 'reality' *e.g.* when we speak of the 'real' question at issue as distinct from the 'verbal,' we constantly mean, distinct from the 'sensal.'

have a different set of words for each special sense. We listen and hear, we glance, behold and stare, gaze and see; we touch and feel, etc. Now suppose that our sense-words were all used indifferently, and that we made no effort to remedy this, insisting when complaint was made that context determined quite well enough whether we meant sight or hearing or touch. In both these cases the loss of distinction would be a serious one. Yet in its meaning as significance, Sense is in fact credited with a number of synonyms, which we use simply at pleasure and only with reference to literary considerations instead of as valuable discriminatives, while no derivatives at all comparable with those from sense exist, from any word which stands for meaning. What is the consequence? That our speech is so far less significant than it might be: we fail to recognise what a wealth of significance lies in the idea of meaning itself, or how much depends upon the development of its applications. What after all is the moral basis of speech-life,—of articulate communion? Significance and lucidity. These are not merely accomplishments, they are ethically valuable. We owe it to our fellows to assimilate truth and to convey it to them unalloyed by needless rubbish of the senseless, the meaningless, the confused and the contradictory. It is our distinct duty to study the causes, to provide against the dangers, and to realise the true significance of ambiguity,—a point to which I shall hope to return later. But we find in serious discussion only too much witness to the absence of any cultivated sense either of the urgent need of conscientious, even scrupulous consistency in expression or of the importance of preserving the plasticity of language. Such a sense ought to be as delicate and as imperative as that of honour and honesty. We recognise that it is essential to good poetry that epithet and metaphor should be exquisitely chosen, should be delicately apposite, bringing us faithfully the picture or the emotion the poet wished for. But this is even more important when the result is to be not merely the highest delight but the most far-reaching and radical effect on knowledge. It is but seldom that a poet's metaphor or epithet can affect the whole outlook of generations to come, or will introduce permanent intellectual confusion. But when a philosophical or scientific writer uses metaphors or special epithets, they are intended to enforce some supposed truth or to convey fact often of crucial importance. It is therefore hardly far-fetched to appeal to the moral aspect of the question and to speak of developing a linguistic conscience. As it is, school-books abound with instances of the vagueness of our ideas of sense or meaning. We find, *e.g.* in an elementary text-book of Algebra: what is

the meaning = what is indicated = what is denoted; and are indiscriminately told to interpret, translate and express, apparently only with the object of avoiding tautology.

One difficulty with which we are thus brought face to face is this: how are we to secure a word for the act or process which has been so much overlooked that we have not yet even acquired a means of expressing it? A given excitation suggests what is not itself and thus becomes a Sign and acquires Sense. What are we to call the act of ascribing, attributing, assigning to, bestowing or imposing upon, the sensation or impression or object, the sense—or meaning, which constitutes its 'sign-hood'? Is the process a 'referential' one? Though Signification as the 'signifying act' would bear the sense above proposed for it, it has the serious disadvantage of being already appropriated to another use. In the absence of anything better I would therefore venture here to speak of the act or process of *sensifying*. It is true that 'to sensify' must share the uncertainty of reference which belongs to sense itself. It might mean *e.g.* the attributing of our 'senses' to a tree or rock, which we suppose to hear, feel, see, etc. like ourselves. But as there is apparently no word which is free from all established associations, we may perhaps be allowed to use 'sensification' for that fundamental tendency to 'assign sense' and 'give meaning' without which Attention, Imitation and even Adaptation itself would either not exist or would be deprived of all their practical value. For the lowest forms of response to excitation or reaction to stimulus only become useful, only become means of physical and mental rise in scale, in so far as they attach some 'meaning' to that which affects them, and thus foster the development of the discriminating function.

It must however be obvious by now that what we are considering is the need not merely of substituting one word for another, not merely of more precise definition or even of more accurate or consistent usage in expression, but of a profound change in mental perspective which must affect every form of thought and may indeed in time add indefinitely to its capacity. If we get this increased power both of signifying and of apprehending or understanding Significance, we might hope for a general agreement as to the possibility of expanding the present limits of valid speculation. Thought might well attain the power to overpass these boundaries with the most indisputably profitable result. There would be less danger of wasting thought and time on plausible but fruitless inquiry.

Indeed one is almost tempted to ask whether the peremptory stress laid by modern science on the futility of

attempts to overleap assumed mental barriers, may not be fully justified as in fact owing to an obscure instinctive sense that as yet thought is only reliable within these frontiers, as the lack of philosophical consensus seems to indicate; while on the other hand the tendency of the speculative mind to explore outlying regions, is in its turn due to an obscure impulse which is equally justified as really predictive. At present, it is true, such regions cannot be opened up for full colonization. Before the pioneer can hope to bring back the necessary information for the future colonist, he needs to be specially equipped for his task, and to have gone through a training which shall tend to heighten his natural powers of observation and inference. And we must not be misled by the popular notion that only a few of us can or may take up the vocation of a pioneer. As a matter of fact every one of us is in one sense a born explorer: our only choice is what world we will explore, our only doubt whether our exploration will be worth the trouble. From our earliest infancy we obey this law. And the idlest of us wonders: the stupidest of us stares: the most ignorant of us feels curiosity: while the thief actively explores his neighbour's pocket or breaks into the 'world' of his neighbour's house and plate-closet.

But the mental pioneer needs equipment, and it must be adequately provided in his training. The child's natural demand for the meaning of, as well as the reason for everything that he sees or that happens, is the best of all materials to work upon. He at least wants all that the richest vocabulary of meaning can give us. Just as every fresh acquirement of feeling-sense interests and excites him: just as he runs to us with the eager account of what he now finds he can detect by his eye or his ear or his finger: just as the exploring instinct develops in forms even sometimes trying to his elders, so it would be if the growth of the meaning-sense were stimulated and cultivated. And the thirst for exploring the inside of our watches might be diverted into the useful channel of exploring their 'meaning,'—or rather the different kinds of value they had, or the different senses in which they were valuable. Thus he would arrive at the *meaning* of one objection to their dissection, and everywhere would acquire fresh occasions for triumphant appeals to our admiration of his discoveries.

Beginning in the simplest and most graphic form: taking advantage of the child's sense of fun as well as of his endless store of interest and curiosity, it ought to be easy to make 'signifies' or 'sensifies' the most attractive of studies. Following the physiological order, it would become the natural introduction to all other studies, while it would accompany

them into their highest developments; clearing and illuminating everything it touched, giving us a self-acting consensus where as yet that seems most hopeless, and suggesting, if not providing, solutions to some of the most apparently insoluble of problems.

Here then, if I am right, would be the gain. The area of confusion, misunderstanding and dispute would be continually shrinking, and the area of really significant expression and intelligent assent constantly expanding, the limits of consensus enlarging with it. The adaptation of language to growing complexity of experience and to continually developing need would become, like that of the organism, more and more adequate: while correspondence—or at least mutual recognition—in usage, would become compatible with endless variety in application and implication: a variety all the more possible because we had at last begun to realise in earnest the lesson which in one form begins with life and in another ends only with experience,—the lesson of Interpretation.

In his *Essentials of Logic*—lectures expressly intended for the elementary student—Mr Bosanquet complains (p. 99) that the commonest mistakes in the work of beginners within his experience as a teacher “consist in failure to interpret rightly the sentences given for analysis.” A much wider bearing, it seems to me, might be given to this remark. It surely applies to the whole field of mental activity. But can we wonder at any kind of failure to interpret, when we realise that the unhappy ‘beginner’ has never, unless incidentally or indirectly, been trained to interpret at all, or even to understand clearly what interpretation—as distinguished *e.g.* from judgment or inference or bare perception—really is?

Various objections may here suggest themselves. The principal ones may perhaps be summed up as (1) that there is no need for such a study as we are pleading for, since the subject is already dealt with in various connections and is implied in all sound educational methods: and (2) that its introduction would be impossible, and even if not impossible would be undesirable, as tending to foster pedantry and shackle thought.

The answer to the first of these objections is of course largely a matter of evidence, and of inference from admitted facts. The unexpected and startling conclusions to which a careful investigation of the present state of things has led me, require, I am well aware, the most irrefragable witness to sustain them. Before attempting to deal with this evidence even in the too brief form alone possible within our present limits—and thus at least to indicate the answer required—I

would lay stress upon two points: first, that the ablest of thinkers, speakers and writers is now at the mercy of students, hearers, and readers, who have never been definitely trained to be significant or lucid or interpretative, and who are therefore liable to read their own confusion of mind on the subject of meaning into the clearest exposition: and, secondly, that where inconsistency or ambiguity may seem to occur even in first-rate writing, it goes to prove that the highest and most thoroughly trained ability does not escape the disastrous effects of comparative indifference to questions of meaning from which all alike inevitably suffer, and for which I am venturing to bespeak special attention.

Bearing this in mind, I may perhaps be allowed to bring forward a few instances taken from logical and psychological sources tending to show how great is the need of such special attention and how little is yet given to it except in an incidental or fragmentary way: although indications of a growing impatience of current confusions and a growing sense of their danger are not wanting.

In the case of the logical use of 'sense' or 'meaning,' etc. it is no doubt necessary to draw a distinction between the technical terms of logic and those which it borrows from ordinary language. It may be said that when the formal logician employs technical terms like intension, connotation, comprehension, extension, denotation, he is bound to give a careful and precise analysis of the sense in which he uses these terms; whereas meaning, sense, etc. not being used as technical terms, need neither be formally differentiated nor made strictly synonymous, since they must always be interpreted by their context. But in the first place, as Dr Keynes and others impress upon us, logic takes no cognizance of context; and in the second I would myself earnestly deprecate either the sacrifice of valuable distinctions by making these and allied terms "strictly synonymous," or such a differentiation of their value as would diminish necessary elasticity, or preclude further modification in their use. Words like premiss, conclusion, postulate, equation, proposition: like real, verbal, positive, negative, relative, simple, complex, are borrowed from ordinary discourse, and are as a rule used in Logic with almost punctilious consistency. It is only when we get to the meaning-terms that we are left to gather as best we may their valid use and application, not merely in Formal Logic technically so called, but also in the discussion of those wider generalizations of the nature and conditions of valid thinking which lead on from Logic proper to Epistemology. As yet we are often left to gauge their value and their scope by a context which itself is often necessarily a severe tax on the

student's attention and power of 'interpretation,' just because of the closeness of the reasoning employed and the dryness and abstraction of the subject.

But there are signs that this will not much longer be the case.

In Mr W. E. Johnson's Notice in *Mind*¹ of Dr Keynes's 3rd edition of his *Formal Logic* he cites a number of additions and even special chapters as pointing to "the growing importance of questions dealing with what is called the import of propositions in view of recent controversies" (p. 240).

Technical distinctions in this, already emphasised, are more minutely applied. A fresh term, Exemplification, is introduced, leading to interesting results and throwing needed light on "the mutual relations between extension and intension" (p. 242). Mr Johnson points out that controversies connected with the "so-called import of propositions" are largely due to "Confusion between three distinct meanings of the term import. These may be called the *formulation*, the *interpretation* and the *fundamental analysis* of propositions."

The 'interpretation' here is what concerns us most; and by this is meant "the assignment of the precise degree and amount of significance to be attached to it." This is a definite step gained: but we still want to be clear whether, to the logician, significance = signification; or whether the difference of termination may not indicate a distinction of logical as well as general value. As "Ordinary language is often ambiguous," there is "need of *interpreting*" (italics Mr Johnson's) "any given form of words. Moreover in the process of reducing propositions to new forms, the logician may unwittingly put more or less of significance into the proposition than it originally bore" (p. 243).

But here and in the following passages 'significance' is used where there is none of that element which 'significance' can alone suggest, and where it would seem that some other word would give adequately and in fact more accurately the 'sense' intended. Might it not conduce to clearness if the use of 'significance' were discontinued in *Formal Logic*? However, the main point is that distinct stress is here laid, for the first time, on questions of interpretation, as well as of formulation and fundamental analysis; and these especially with reference to Import itself. Developments may thus be hopefully looked for.

In Dr Keynes's own work (3rd edition) I will venture to take one illustration of the point now under consideration.

¹ April, 1895.

In the exercises at the end of Chapter VII. (Part II.) the student is directed to "assign precisely the meaning of" an assertion, and to "examine carefully the meaning to be attached to" a denial (p. 210). But he may surely ask which of the many interpretations of 'meaning' he is to adopt here. To refer only to pp. 160—5, we may choose for 'meaning' any of the various 'senses,' intention, signification, connotation, application, import, purport, implication. Of a certain inference also it is said (p. 164) that "this would mean" (*i.e.* involve) the introduction of certain symbols. Ordinary logical doctrine, Dr Keynes reminds us, "should not depart more than can be helped from the forms of ordinary speech" (p. 165). But how confused these often are is illustrated by this very sentence; as the 'meaning' obviously is "more than *cannot be hindered*" (or strictly, 'avoided'). "Make no more noise than you can help" is of course "make no more noise than you *cannot avoid making*." Such an instance forcibly illustrates Dr Keynes's contention that "it is obviously of importance to the logician to clear up all ambiguities and ellipses of language" (p. 168).

In a Manual for use by students, Mr Welton tells us that

"Generalisation extends the application of words and so lessens their fixed meaning, and thus allows the same word to have different senses" (p. 13). A word may thus "call up very different ideas in different minds, or in the same mind at different times. Such terms are particularly unsuited to scientific discussion, and when they are used in it they invariably lead to misunderstanding and dispute" (p. 14).

Is 'idea' here a synonym of sense? Are application and sense convertible terms? Are not these words, *thus left undefined*, themselves "unsuited to scientific discussion" as tending to confusion? He takes the view that "An individual name may be a mere verbal sign devoid of meaning.....Proper names...can only *suggest*, not imply, and are therefore in themselves *unmeaning*" (pp. 62—3). (*Italics my own.*)

This distinction, we are assured, is of fundamental importance, and, through overlooking it, Jevons, Bradley and other logicians take the opposite view. But how comes it that logicians of such acumen and eminence 'overlook' a point of such importance? What hinders consensus? And what is the student to gather from all this? For instance, is he to conclude that the suggestive may be the unmeaning?

Dr Venn¹ writes with reference to convertible terms, "Even if we can find two which strictly mean the same thing, that is, which apply to exactly the same object or class, there are sure

¹ *Empirical Logic.*

to be differences amongst the many associations which cluster about them and blend with the true meaning" (p. 43).

Here to *mean* and to *apply* are used as synonymous. But presently we read of "Two aspects under which a name may be viewed. These are respectively its meaning and its range of application.....characteristics which it is meant to imply and objects to which it is found to apply....The more meaning we insist upon putting into a name the fewer.....the objects to which that name will be appropriate; the less the meaning contained, the wider will be the range of application of the name" (p. 174).

Is this "logical consistency"? How can we hope for it in the case of terms like 'meaning' until the ideas which they stand for have been carefully analysed? At present they seem marked out for loose usage even among the most accurate of writers.

But if, with Prof. Adamson, we are to admit that we cannot yet define even the exact status or province of Logic itself, since it is sometimes treated as an abstract science, sometimes as a subordinate branch of one, sometimes as a nondescript receptacle for formulations of method, it may be unreasonable to expect much from the present point of view until the various meanings of the term Logic are more clearly differentiated and more universally accepted. At present, as he says,

"The diversity in mode of treatment is so great that it would be impossible to select by comparison and criticism a certain body of theorems and methods, and assign to them the title of logic.....In tone, in method, in aim, in fundamental principles, in extent of field, they diverge so widely as to appear, not so many different expositions of the same science, but so many different sciences. In short, looking to the chaotic state of logical text-books at the present time, one would be inclined to say that there does not exist anywhere a recognised, currently received body of speculations to which the title logic can be unambiguously assigned, and that we must therefore resign the hope of attaining by any empirical consideration of the received doctrine a precise determination of the nature and limits of logical theory¹."

If we can gain a classification of meaning-sense itself, not merely as wide or narrow, direct or indirect, but as applicative, implicative, acceptative, indicative, &c., it must in some degree help towards more clearly determining, discriminating and relating the senses in which we may legitimately apply an all-important term like Logic: and would thus enable the true distinctions within such a concept to be definitely and consistently utilised, while fallacious or misleading uses would tend to expose and condemn themselves.

¹ "Logic" (*Encyc. Brit.*).

III.—LOCKE'S THEORY OF MATHEMATICAL KNOWLEDGE AND OF A POSSIBLE SCIENCE OF ETHICS.

BY JAMES GIBSON.

THE aim of the following paper is purely historical. I do not propose either to criticise the explanation which Locke gives of mathematical knowledge, or to dwell upon the obvious futility of the analogy which he seeks to establish between the subject-matters and methods of Mathematics and Ethics; but to endeavour to ascertain what Locke's theory on the subject really was, and the relation in which his theory stands to the previous development of thought in England. This purpose will, I think, be most readily attained if we consider first the theory of the *Essay*. Having ascertained the nature of Locke's own theory, we shall be better able to appreciate the significance of its historical antecedents than we should be if we followed the historical order.

Beginning then with the theory of Locke, we must notice first the extent to which his general conception of knowledge is dominated by the mathematical sciences which had made such enormous advance in his age. Those mathematical demonstrations, which, as he says, "like diamonds are hard as well as clear," excited his intense admiration, and formed the standard by which he tested the other departments of science and found them wanting. His theory of knowledge is as essentially a mathematical one as that of Descartes. Indeed, in some respects, his general theory is more deserving of the term mathematical, and his account of our knowledge of mathematics is superior to that of the professed mathematician. Descartes was so impressed by the universality of application of the analytical method, that he tended to represent mathematical demonstrations as entirely a matter of logic, (not, it is true, of the purely analytical logic of the Aristotelians) and to overlook the necessity of that appeal to intuition which lies behind every proposition in mathematics. Now, though the functions of intuition and thought are as little distinguished by Locke as by

Descartes, the *rôle* played by intuition in his theory is in reality much larger. The geometry of Euclid, with its frequent appeal to the ideal superposition of one figure upon another, comprised all the mathematics with which he was thoroughly familiar, and coloured his whole view of mathematical and other knowledge. For he failed to observe that this method of superposition is not applicable beyond the region of geometry. Accordingly, the "juxtaposition" of ideas and "application" of ideas to one another, become terms of constant occurrence in his account of our knowledge of the relations of ideas, which yet, he holds, is not necessarily confined to mathematics; and where this juxtaposition and application cannot be immediately made, we are told to look for "a common measure" of our ideas. The whole process of reasoning is resolved into the search for, and employment of, such common measures. Thus, we are told, "the principal act of ratiocination is the finding the agreement or disagreement of two ideas one with another by the intervention of a third: as a man by a yard finds two houses to be of the same length, which could not be brought together to measure their equality of juxtaposition¹."

Locke's general conception of knowledge being thus governed by mathematical analogies, we are prepared to find him deny that there is anything in the conception of Quantity, which renders it in any peculiar way susceptible of scientific treatment. The unique position of mathematical knowledge was however apparent to him, and when he comes to consider why it is that Mathematics is the only branch of knowledge which has been developed into a truly scientific form, and in particular why it has so far outstripped what he regards as a possible demonstrative science of Ethics, its special characteristics do to some extent force themselves upon his attention. It must be remembered, however, that the passage we are about to examine is not intended by him to limit that demonstrative knowledge, which he always describes by geometrical analogies, to the region of mathematics; but is put forward as an explanation why this limitation has been erroneously thought to exist.

"The reason why it" (*i.e.* demonstration) "has been generally sought for and supposed to be only in those," (*i.e.* the mathematical sciences) "I imagine has been not only the general usefulness of those sciences, but because, in comparing their equality or excess, the modes of numbers have every the least difference very clear and perceivable: and though in extension every the least excess is not so perceptible, yet the mind has

¹ Bk iv. Ch. xvii. § 18.

found out ways to examine and discover demonstratively the just equality of two angles, or extensions, or figures; and both of these, *i.e.* numbers and figures, can be set down by visible and lasting marks wherein the ideas under consideration are perfectly determined; which for the most part they are not, where they are marked only by names and words¹."

The demonstrative character of the science of number is here attributed primarily to the discreteness of its subject-matter, in consequence of which every one of the modes of number is easily distinguishable from every other". With regard to the elementary propositions of arithmetic we obtain no information beyond the bare assertion that the relations expressed by them are immediately "perceived." Like Kant, Locke is inclined to pass too lightly over the case of Arithmetic. This tendency is still more apparent when we ask what part is played in arithmetic by those "visible and lasting marks" of which he speaks in the concluding clause of the sentence. The only marks which could "perfectly determine" our ideas of number would be the concrete representations of the numbers by so many strokes or points; yet, from his subsequent references to the subject, the conventional numerical characters appear to be all that is really in his mind.

With regard to the "ways" which the mind has found out for proving equality in extension there is a little difficulty. As the passage stands, we seem to have only a repetition of the fact to be explained, *viz.*, that in geometry "ways" have been discovered which enable us to demonstrate the connections of the ideas concerned, while in the other sciences which are held to be equally capable of demonstration no such "ways" have yet been found. By these "ways," however, we must suppose him to mean (principally at least, for the services of Algebra in the new analytic geometry were also in his mind), the method of ideal superposition. He refers to them immediately afterwards as "ways to measure"; but to suppose that the empirical measurements of actual figures was what he intended, would be inconsistent with his whole view of the mathematical sciences.

The possibility of representing our geometrical ideas in "visible and lasting marks," is that which seems to bring him nearest to the explicit recognition of the intuitive character of

¹ Bk iv. Ch. ii. § 10.

² Cf. Bk ii. Ch. xvi. § 3. "The simple modes of number are of all other the most distinct; every the least variation which is an unit, making each combination as clearly different from that which approacheth nearest to it, as the most remote; two being as distinct from one as two hundred.... This is not so in other simple modes."

the science; and from the manner in which he treats these marks we shall best learn to what extent he was conscious of the distinction. What, then, were the functions attributed by Locke to the diagram in geometry? Further on in the *Essay* he repeats and expands his view on the subject. "That which, in this respect, has given the advantage to the ideas of quantity, and made them thought more capable of certainty and demonstration, is, first, that they can be set down and represented by sensible marks, which have a greater and nearer correspondence with them than any words or sounds whatsoever. Diagrams drawn on paper are copies of ideas in the mind, and not liable to the uncertainty which words carry in their signification. An angle, circle, or square, drawn in lines, lies open to the view, and cannot be mistaken: it remains unchangeable, and may at leisure be considered and examined, and the demonstration be revised, and all the parts of it may be gone over more than once, without any danger of the least change in the ideas¹." From this it would appear that the only advantage which he conceived geometry to possess, from the possibility of the sensible intuition of its ideas in space, is that the diagram keeps the same idea before the mind, and prevents misunderstanding in the communication of geometrical demonstrations. As he tells us elsewhere, the use of the diagram to the geometrician is "steadily to suggest to his mind those several ideas he would make use of in that demonstration²." In a word, it is not the intuitive character of the diagram, but its objective constancy upon which he lays stress. The mark is "visible" to all and "lasting." The diagram is only a superior substitute for the name, or arbitrary sign, and it is only "for the most part" that our ideas are not "perfectly determined" when they are "marked only by names and words³."

Our mathematical knowledge in fact still remains merged for Locke in our general knowledge of the relations of ideas. In the figure employed by the geometrician in his demonstrations, which, while in its existence particular, is yet thought by him as universal, intuition and thought, the particular and the universal are found united; and this is taken by Locke as his general type of knowledge. Accordingly Locke holds that this species of knowledge by means of the intuition of relations between ideas is not confined to the region of mathematics. We can have this mathematical certainty in other subjects besides mathematics. Take, for instance, the principle of causality. "Everything that has a beginning must have a cause, is a true principle of reason, or a proposition certainly

¹ Bk iv. Ch. iii. § 19.

² First Letter to the Bishop of Worcester.

³ Bk iv. Ch. ii. § 10.

true; which we come to know by the same way, *i.e.* by contemplating our ideas, and perceiving that the idea of beginning to be, is necessarily connected with the idea of some operation; and the idea of operation with the idea of something operating, which we call a cause; and so the beginning to be, is perceived to agree with the idea of a cause, as is expressed in the proposition¹. And similarly, though he cannot discover what it is in itself, he never has any hesitation in affirming that phenomena imply some unknown basis as their support, because "we cannot conceive how modes or accidents can subsist by themselves²."

But when we seek to proceed beyond these general principles to their application, a great contrast presents itself between our physical and mathematical knowledge, into the meaning of which we must now enquire. The preeminence of mathematics, according to Locke, rests upon its purely ideal character, which seems at first sight to relegate it to the region of those "fictions at pleasure" which have no foothold in reality. Our mathematical ideas are formed "without patterns or reference to any real existence³," yet the knowledge they furnish is "real." How, now, does Locke reconcile these positions?

In the first place, we may observe that the objective reality of space itself is always regarded by Locke as guaranteed by the "simplicity" of the idea, which consequently we cannot have made for ourselves. The geometer, however, is not concerned with space itself as a whole, but with the properties of figures in space. And these figures are not merely ideas but ideals. He proves propositions, for instance, which are only true of the perfect rectangle or the perfect circle, and yet, "it is possible he never found either of these existing mathematically, *i.e.*, precisely true, in his life⁴." The knowledge thus gained, Locke tells us, is "true and certain even of real things existing: because real things are no farther concerned, nor intended to be meant by any such propositions, than as things really agree to those archetypes in his mind⁵." But, it may be asked, could we not justify on similar grounds the reality of any "insignificant chimaeras of the brain," or the dreams of a Ghost-seer? This is an objection which Locke himself endeavours to meet. Though we need not wait to find an actually existing perfect circle, before pronouncing our geometrical knowledge of the circle "real," we must, he holds, be able to show its real possibility. It is necessary for the reality of the science that our mathematical ideas should be

¹ First Letter to the Bishop of Worcester.

² *Loc. cit.*

³ Bk II. Ch. v. § 3.

⁴ Bk IV. Ch. iv. § 6.

⁵ Bk IV. Ch. iv. § 6.

"so framed that there be a possibility of existing conformable to them¹." Elsewhere we read that propositions only "contain real truth when these signs (*i.e.* words) are joined as our ideas agree; and when our ideas are such as we know are capable of having an existence in Nature²."

The question then arises, how can we show the real possibility of these ideas apart from experience, and know that the workmanship of the mind is capable of a real existence? Locke's answer would seem to be that we can do so when our knowledge of the idea and its implications is perfect; when, so to say, the idea is quite transparent to intelligence. Our ideas of geometrical figures, he holds, are so complete and self-contained that we can be sure that when there is no inconsistency in the idea there can be none in reality. We know a circle or triangle through and through without any perplexing remainder. The mind, he tells us, "does not conceive that any understanding hath, or can have, a more complete or perfect idea of that thing it signifies by the word 'triangle,' supposing it to exist, than itself has in that complex idea of three sides and three angles; in which is contained all that is or can be essential to it, or necessary to complete it, wherever or however it exists³." And the presupposition which underlies Locke's theory is that when our ideas are thus perfect and complete, the absence of inconsistency in the idea carries with it of necessity the absence of inconsistency in reality. Without this rationalistic assumption his whole argument would fall to pieces.

We must, however, examine more closely the opposition which Locke discovers between the subject-matters of Mathematics and the physical sciences, as a consequence of which we are able to attain to a knowledge of the former which is at once universal and real, while in respect of the latter our assertions can only become universal at the expense of becoming verbal or trifling. The implications of his conception of mathematical knowledge are most clearly revealed in the difficulties which he finds in the way of a scientific knowledge of substances. For this purpose it will be necessary to consider briefly the meaning which the terms "real" and "reality" have for Locke, about which there is, I think, a good deal of current misconception. At the back of Locke's thought there lies a metaphysical theory, never explicitly enunciated, indeed, because to formulate metaphysical theories was not the purpose of the *Essay*, but assumed throughout as something beyond questioning. According to this theory, reality consists of a number of self-subsisting entities or substances. Everything

¹ Bk II. Ch. xxx. § 4.

² Bk IV. Ch. v. § 8.

³ Bk II. Ch. xxxi. § 3.

has a "real constitution" of its own, which lies "within itself, without any relation to any thing without it¹," and this strictly private constitution is what it really is. It is for this reason that Locke declares that relations are "not contained in the existence of things" but are "something extraneous and superinduced." They are not contained "in things as they are in themselves²," but depend upon a comparison of things made by the mind. It is because they are "superinduced to the substance³," not, as Green⁴ supposed, because they are an addition to the simple idea which cannot be represented in momentary consciousness, that they are in a sense regarded as unreal.

Needless to say, as soon as reality is brought into contact with thought, this metaphysical theory and the terms in which it is expressed break down, and Locke proceeds to consider as "real," constituents of knowledge for which no defence could be made at the bar of his metaphysical theory. An idea is held to be real when it is not a mere "fiction of the mind," but possesses some "foundation in Nature," "correspondence," or "conformity" with Nature. As a consequence, however, of his metaphysical theory of what constitutes reality, there results a difference in the criteria by which the reality of different kinds of ideas is to be determined. Seeing that substances are the constituents of reality, our ideas of substances are held to carry an existential implication, which is not present in other ideas. As ideas of substances they refer to archetypes existing without us, of which they are "supposed copies," and are unreal if these archetypes have never existed in Nature; whereas of mixed modes and relations, which confessedly lack metaphysical reality, our ideas are regarded as real if they have applicability to the real world, or if they are such as are merely capable of exemplification in Nature. "When we speak of justice or gratitude, we frame to ourselves no imagination of anything existing," (or, we may add, in the metaphysical sense here intended, capable of existing) "which we would conceive; but our thoughts terminate in the abstract ideas of those virtues, and look no farther; as they do when we speak of a horse or iron, whose specific ideas we consider not as barely in the mind, but as in things themselves, which afford the original pattern of those ideas⁵." The contrast between the metaphysical reality which mixed modes and relations cannot possess, and the epistemological reality of which their ideas are susceptible, is clearly indicated in the following passage. "Mixed modes and relations having no other reality but what they have in the minds of

¹ Bk III. Ch. vi. § 6.

² Bk II. Ch. xxv. § 4.

³ Bk III. Ch. v. § 12.

⁴ Bk II. Ch. xxv. § 1.

⁵ Introduction to Hume, § 32.

men, there is nothing more required to those kinds of ideas to make them real but that they be so framed that there is a possibility of existing conformable to them¹." On the other hand, we are told that even could we be assured of the possibility of the existence of something corresponding to an idea of substance, this would not be sufficient to justify us in regarding the idea as more than imaginary. Of centaurs, and similar ideas of substances formed by the mind itself, we read, "Whether such substances as these can possibly exist or no, it is probable we do not know: but *be that as it will*, these ideas of substances being made conformable to no pattern existing that we know, and consisting of such collections of ideas as no substance ever showed us united together, they ought to pass with us for barely imaginary²."

We see then that Locke has a different standard by which to determine the reality of our ideas of substances from that which he applies to our ideas of mixed modes, and that this difference of epistemological criteria results from his metaphysical conception of reality as made up of so many independent and self-subsistent entities. Now, since for the reality of knowledge it is necessary that there should be "a conformity between our ideas and the reality of things³," or that "our ideas should answer their archetypes⁴," the natural conclusion would seem to be, that for a real knowledge of substances, the actual existence of the corresponding entities and the derivation of our ideas from them are essential conditions. But when Locke comes to treat, in the fourth Book, not of the reality of ideas considered in abstraction from each other, but of the reality of those relations between ideas which constitute knowledge, a different line of thought suggests itself to him. It is not the reference to actual existence contained in our ideas of Substances, but a deficiency in the ideas themselves upon which he now dwells. We are explicitly told in one place that for a knowledge of the properties of substances their actual existence *in rerum Natura* is not required. "Had we such ideas of substances as to know what constitutions produce those sensible qualities we find in them, and how those qualities flowed from thence, we could, by the specific ideas of their real essences in our own minds, more certainly find out their properties and discover what qualities they had or not, than we can now by our senses: and *to know the properties of gold, it would be no more necessary that gold should exist*, or that we should make experiments upon it, *than it is necessary for the knowing the properties of a triangle, that a triangle should exist*

¹ Bk II. Ch. xxx. § 4.

³ Bk IV. Ch. iv. § 3.

² Bk II. Ch. xxx. § 5.

⁴ Bk IV. Ch. iv. § 8.

*in any matter: the idea in our minds would serve for the one as well as for the other*¹." Further, we even read, in direct contradiction of what we saw to be the teaching of Bk. II., that the necessity for an empirical derivation of our ideas of substances results from our inability to determine their real possibility *a priori*. Locke begins indeed in the old strain. "Our ideas of substances, being supposed copies and referred to archetypes without us, must still be taken from something that does or has existed; they must not consist of ideas put together at the pleasure of our thoughts though we can perceive no inconsistency in such a combination." But now comes the change of position. "The reason whereof is, because we knowing not what real constitution it is of substances whereon our simple ideas depend, and which really is the cause of the strict union of some of them one with another, and the exclusion of others; there are very few of them that we can be sure are or are not inconsistent in Nature, any farther than experience and sensible observation reach²." The truth would seem to be that when treating of knowledge his metaphysical theory receded further in his mind than when dealing with mere ideas. Regarded as constituents of knowledge, our ideas of substances do not possess that unique character which the presuppositions of his *Metaphysics* had led him to attribute to them. Locke is thus led at least to suggest as a criterion for the knowledge of substances as well as of modes and relations, the principle of complete intelligibility, forgetful of those unknown and unknowable things-in-themselves, whose isolated self-subsistence constituted for him the true nature of reality, and by reference to which the derivative reality possessed by ideas and knowledge was to be determined. He nowhere, however, shows any consciousness of the nature of this admission, or of its inconsistency with his general theory.

It remains for us to consider what are the characteristics which Locke discovers in our ideas of substances, which prevent these from becoming the subject-matter of scientific knowledge. Why cannot we know *a priori* the real possibility of ideas of substances as well as of ideas of modes and relations? To begin with, our ideas of substances are largely made up of simple ideas of one sense, and these are peculiarly insusceptible of those intuitive relations which constitute knowledge. We have seen that Locke rested the demonstrative character of arithmetic upon the discreteness of number and the consequent distinctness of its ideas. This feature of the science of number is not fully shared by any other department of knowledge. "In other simple modes.....it is not so easy, nor perhaps possible, for us

¹ Bk iv. Ch. vi. § 11.

² Bk iv. Ch. iv. § 12.

to distinguish betwixt two approaching ideas, which yet are really different. For who will undertake to find a difference between the white of this paper and the white of the next degree to it? or can form distinct ideas of every the least excess in extension¹?" In Geometry, however, we can by means of the method of superposition find "ways to measure" the exact equality of lines, angles and surfaces. In comparison with Arithmetic, therefore, Geometry does not labour under any inferiority of certainty or exactness, but only of generality and precision of application to the real. The most we can say in the case is that "demonstrations in numbers, if they are not more evident and exact than in extension, yet they are more general in their use, and more determinate in their application²." But in those other simple ideas which differ only qualitatively and intensively we can neither immediately perceive, nor by any artifice measure their exact differences. "In other simple ideas, whose modes and differences are made and counted by degrees, and not quantity, we have not so nice and accurate a distinction of their differences as to perceive or find ways to measure their just equality or the least differences³." The continua of these ideas of secondary qualities are not therefore in themselves capable of measurement or of direct scientific treatment, and the only possibility of reducing them to a scientific form lies in their resolution into those insensible primary qualities on which they depend; and this resolution we cannot perform. "Being appearances of sensations produced in us by the size, figure, number, and motion of minute corpuscles singly insensible, their different degrees also depend upon the variation of some or all of those causes; which, since it cannot be observed by us in particles of matter whereof each is too subtle to be perceived, it is impossible for us to have any exact measures of the different degrees of these simple ideas⁴."

The case is no better when we proceed to consider these ideas in the relations in which they stand to each other. We can of course affirm each of itself, and deny it of every other⁵, but we cannot detect between our ideas of secondary qualities any of those special intuitive relations in which "positive knowledge" consists. They form, indeed, the principal components of our complex ideas of substances, in which we conceive

¹ Bk II. Ch. xvi. § 3.

³ Bk IV. Ch. ii. § 11.

² Bk II. Ch. xvi. § 4.

⁴ *loc. cit.*

⁵ This is all that can really be meant when we are told that "where the difference is so great as to produce in the mind clearly distinct ideas, whose difference can be perfectly retained there, these ideas of colour, as we see in different kinds as blue and red, are as capable of demonstration as ideas of number and extension." Bk. IV. Ch. ii. § 13.

several of them as united in the same subject; but nevertheless we cannot by the mere contemplation of these ideas perceive any necessary connections of coexistence between them, or even pronounce that any given combination of them has so much as a possible existence in nature. We can be certain, it is true, that "no subject can have two smells or two colours at the same time¹"; but between a smell and a colour we can perceive no incompatibility. "I imagine, amongst all the secondary qualities of substances and the powers relating to them, there cannot any two be named whose necessary coexistence, or repugnance to coexist, can certainly be known, unless in those of the same sense, which necessarily exclude one another²." Considered in themselves these ideas of different senses seem quite indifferent to each other. We cannot, however, from this infer the real possibility of their coexistence in the same subject. Though thus seemingly independent of each other, they are all in Locke's view dependent ideas. Owing to their variability, they cannot appertain to the real constitution of anything, which is fixed and permanent, but are merely incidental effects produced in us by the spacial relations of the minute particles of matter, to which, Locke assumes, such an objective existence may be ascribed. They are thus dependent for their existence on certain unknown "primary" qualities; and between the ideas of these unknown qualities there may be an inconsistency, which would render the coexistence of the corresponding secondary qualities impossible. Until then we know those "primary qualities of the insensible parts of matter" from which they spring, and the manner in which they spring from them, we cannot *a priori* be certain that any given combination of secondary qualities has even a possible existence in nature. As long as these conditions remain unrealised, we can only know that there is no incompatibility of existence by actually experiencing the coexistence in question.

The dependence of secondary upon primary qualities not only prevents us from forming *a priori* complex ideas of their combinations, but also opens out the only possibility of a scientific knowledge of nature which Locke is able to conceive. This hypothetical science would not afford a knowledge of coexistences of secondary qualities, but of the mechanical operations of one body upon another. "That the size, figure, and motion of one body should cause a change in the size, figure, and motion of another body, is not," Locke thinks, "beyond our conception. The separation of the parts of one body upon the intrusion of another, and the change from

¹ Bk. iv. Ch. iii. § 15.

² Bk. iv. Ch vi. § 10.

rest to motion upon impulse; these, and the like, seem to us to have some connection one with another. And if we knew these primary qualities of bodies, we might have reason to hope we might be able to know a great deal more of these operations of them one upon another¹. At times he speaks more confidently. "I doubt not but if we could discover the figure, size, texture and motion of the minute constituent parts of two bodies, we should know without trial several of their operations one upon another, as we do now the properties of a square or a triangle²." And as examples of such operations he instances the effects produced upon the human constitution by rhubarb, hemlock, and opium. But even if our faculties of sense were improved or aided to the extent necessary to render such knowledge possible, there would still remain "another and more incurable part of ignorance³." For we could never hope to connect these mechanical explanations of the processes of nature with the secondary qualities by which they are revealed to our sensitive consciousness. "We are so far from knowing what figure, size, or motion of parts produce a yellow colour, a sweet taste, or a sharp sound, that we can by no means conceive how any size, figure, or motion of any particles can possibly produce in us the idea of any colour, taste, or sound whatsoever; there is no conceivable connection between the one and the other⁴." The immediacy of mere sensation, therefore, must always constitute a limit to our scientific knowledge.

These "simple ideas of one sense" which had held such a prominent place in Locke's account of the origin of knowledge, fall then completely into the background in his examination of knowledge itself. Since in this case we cannot "distinguish betwixt two approaching ideas, which are really different," they lack that distinctness which is held to be essential to every idea, and to that extent cease to be strictly ideas; the closest scrutiny fails to detect in them any of those special intuitive relations by means of which other ideas are formed into systems of knowledge; and, finally, in them we discover an insurmountable barrier in the way of a perfectly intelligible acquaintance with Nature in its manifestations to our consciousness.

Ethics is the subject which Locke specially singles out as capable of being raised to the form of a demonstrative science by means of our present faculties. It is mainly concerned, like Mathematics, with ideas of mixed modes and relations, in which there is no implication of actual existence. Moreover, unlike our present ideas of substances when their existential implication is dropped out of view, our ethical conceptions in Locke's

¹ Bk iv. Ch. iii. § 13.

² Bk iv. Ch. iii. § 25.

³ Bk iv. Ch. iii. § 12.

⁴ Bk iv. Ch. iii. § 13.

opinion admit of those special intuitive connections in which knowledge consists.

It must be owned that in the attempt contained in the *Essay* to exhibit demonstrably certain propositions in Ethics Locke did not meet with much success. Property being defined as "a right to anything," and injustice as "the invasion or violation of that right," it no doubt follows that "where there is no property there is no injustice¹." But the assertion is not exactly a light-bearing one, nor is it easy to see how it can escape the condemnation of "trifling." And so of his other example, "No Government allows absolute liberty²"; where Government is defined as "the establishment of society upon certain rules or laws which require conformity to them," and absolute liberty as "for anyone to do whatever he pleases." Indeed, Locke himself seems to have come to feel that in his first edition he had spoken somewhat too confidently of the extension of demonstrability beyond Mathematics. For in place of the assertion that "it is not only mathematics, or the ideas alone of number, extension and figure, that are capable of them (*i.e.* demonstrations), no more than it is these ideas alone and their modes, that are capable of intuition³," he subsequently substituted the following much more humble claim. "It has been generally taken for granted, that mathematics alone are capable of demonstrative certainty: but to have such an agreement or disagreement as may intuitively be perceived, being, as I imagine, not the privilege of the ideas of number, extension, and figure alone, it may possibly be the want of due method and application in us, and not of sufficient evidence in things, that demonstration has been thought to have so little to do in other parts of knowledge and been scarce so much as aimed at by any but mathematicians⁴." The "want of due method and application in us" which he here mentions, were two causes he was always inclined to assign for our failure to raise Ethics to the level of a science. The want of "indifferency," since "vices, passion, and dominating interest" are opposed to it, is an obstacle repeatedly recognised; while the special difficulties inherent in the subject, might, he always hopes, be some day overcome by an extension of "Algebra, or something of that kind⁵."

The greater caution in pressing the claims of Ethics to the dignity of a demonstrative science which we find in the fourth edition, is also to some extent reflected in Locke's correspondence with Molyneux. Early in their intercourse his admiring

¹ Bk iv. Ch. iii. § 18.

² *loc. cit.*

³ Bk iv. Ch. ii. § 9.

⁴ *loc. cit.*, 4th and following Editions.

⁵ Bk iv. Ch. iii. § 20.

correspondent urged the author of the *Essay* to "oblige the world with a treatise of morals, drawn up.....according to the mathematical method." To this request Locke replied that "though by the view I had of moral ideas, whilst I was considering that subject, I thought I saw that morality might be demonstrably made out; yet, whether I am able so to make it out is another question¹," at the same time promising to consider the matter further. Molyneux, however, would not be so easily denied, and returns to the subject again with ardour², and he appears not to have been alone in his insistence on this fresh undertaking. Some years later Locke writes that he has laid up some materials for such a work, but excuses himself from its execution on the grounds of age and ill-health. The Gospel, too, he holds, "contains so perfect a body of Ethics that reason may be excused from the enquiry," and he confesses that he is one who prefers to "employ the little time and strength he has in other researches, wherein he finds himself more in the dark³."

Although Locke was never able to satisfy the desire of his friend, and seems to have felt at least something of the difficulties which lay in the way of any attempt to do so, he never really wavered from his conviction that a strictly demonstrative method could be applied to Ethics. His explanation of the demonstrative character of Mathematics, with all that this involves, and the parallel which he instituted between Mathematics and Ethics, constitute, indeed, two of the main positive conclusions of the *Essay*. To have shown how in these two fields of thought at least, the human mind can construct systems of knowledge at once certain and universal, must have appeared to the author a very considerable achievement. Nor would his sense of satisfaction be lessened by the consciousness that he had only reached in a more thorough and systematical manner results which others had been more tentatively approaching. For in this, as in so many other respects, Locke was but giving its most complete expression to one of the intellectual movements of his age. The attempt to find an explanation for the unique position of Mathematics, and to raise Ethics to a similar level of scientific certainty, had engaged other thinkers in England before Locke, and in order fully to comprehend the significance of Locke's theory it will be necessary to consider the historical development of the problem.

When the modern world had finally turned its back upon

¹ Locke to Molyneux. Sept. 20th, 1692.

² Molyneux to Locke. Dec. 22nd, 1692.

³ Locke to Molyneux. March 30th, 1696.

the appeals to authority, upon which the superstructure of Scholasticism had rested, and determined to see truth with its own eyes, it found one of its main sources of inspiration, and one of its earliest fields of successful achievement, in Mathematics. How small a place Mathematics had found in the recognised system of education under the old regime we perhaps best realise when we remember that Hobbes was forty years of age when for the first time he turned over the leaves of Euclid's Elements. The freshness and charm which he found in the closely knit chain of demonstration did not appeal to him alone. Here at last, it seemed to thinkers of that period, was furnished a model of what Scholasticism had failed to supply, and of what the modern seekers after truth had not hitherto attained, *viz.*, a system of demonstrative knowledge which carried one on from step to step with irresistible conviction. To reduce all knowledge to a mathematical type, became for its more daring speculators the leading epistemological problem of the age; while more cautious thinkers sought to discover a reason for the pre-eminence in demonstrative capacity of mathematical conceptions.

With the wider questions of the influence of Mathematics upon general theories of knowledge, we are not now immediately concerned. Our interest must be concentrated upon the more critical form of enquiry thus suggested, which seeks an explanation for the apparently solitary grandeur of the mathematical sciences, with a view to raising other branches of knowledge to equal thrones, if that be possible.

Hobbes, while endeavouring to give his general theory of knowledge a mathematical colouring by means of his crude representation of reasoning as a process of addition and subtraction, recognises the unique position of the mathematical sciences. Geometry, he declares, is "the only science that it hath pleased God hitherto to bestow on mankind" (*Leviathan*, Pt I. Ch. iv.). But he has no reason to offer in explanation of its pre-eminence beyond the circumstance that in Geometry men have settled the signification of words in definitions which are set out at the start, and the suggestion is that equally good results might be obtained in other branches of knowledge, if only men would be more careful in defining the terms they make use of. It is to Hobbes that we must trace the attempt of subsequent writers to establish a close relation between Ethics and Mathematics. His speculations, where they touched upon the question of conduct, seemed to his contemporaries to be simply subversive of morality. In opposition to such a result, the current of British speculation was turned towards the attempt to construct a rational system of

Ethics, and since Mathematics was the only department of knowledge which had yet been reduced to the form of a science, to do so appeared to be equivalent to showing that Ethics might be placed on a level with Mathematics. The problem consequently becomes at once more urgent and more definite. It is henceforth, not simply how is a demonstrative science of Mathematics possible, and how can other branches of knowledge be reduced to a similar scientific form; but how can the rules of human conduct be rescued from the merely conventional interpretation which seems to threaten them, and be shown to be as demonstrably certain as the propositions of Mathematics.

The attempt to find a rational foundation for morality was first made in England by the group of thinkers commonly known as the Cambridge Platonists¹. The objective validity of moral distinctions—the “eternal and immutable” nature of morality—was made by them to depend upon the nature of the subject-matter of Ethics. In contradistinction to the transitory affections of sense, they sought to bring out the presence in knowledge of permanent *a priori* notions or Ideas, due to the activity of the mind itself. From the comparison of such notions, and the detection of their relations to each other, resulted, according to them, what is properly speaking knowledge, an apprehension of truths which are in their nature eternal; and it is with such notions and such knowledge that Ethics is concerned. Although some members of the School might hesitate to ascribe to the propositions of Mathematics the full dignity of “*Æternæ Veritates*”², whenever an attempt was made to illustrate the nature of these intelligible Ideas, and of the knowledge of which they are the subject-matter, resort was almost invariably had to Mathematics. Thus, although no direct attempt is made to connect Mathematics and Ethics, both sciences being included in a more general theory of knowledge, by their insistence on the ideal or non-sensible character of mathematical conceptions³, and by their special endeavour to represent Ethics as a similarly constituted body of demonstrative knowledge, the Cambridge Platonists were not without their influence on the special problem which we are investigating.

¹ The numerous points of connection between Locke and the members of this School have been brought out by Dr von Hertling.

² *E.g.* Smith, following Plato, refers Mathematics to a lower stage of knowledge than that on which we attain to “a naked intuition of eternal truth” (*Select Discourses*, London, 1660, pp. 97–8).

³ Thus Cudworth writes: “There is no material triangle to be found that is mathematically exact and accurate.” (*Treatise*, Bk iv. Ch. iii. § 17.)

For the Cambridge Platonists the separation of the subject-matter of Mathematics from sensible existence could in no way derogate from its reality. The point of view, however, from which greater reality is ascribed to universal notions than to the particular things of sense, was not one which could be long maintained in seventeenth-century England. Now, if we look for reality to the world as revealed to sense, and at the same time maintain the non-sensible nature of mathematical conceptions, the only course open to us is to describe the subject-matter of the mathematical sciences as a mental construction; making subsequently the best defence we can for the reality of the knowledge so attained. The first hint of this position seems to be given by Glanville, who subscribes to the remark of Hobbes, that Mathematics is "the only science Heaven hath yet vouchsafed humanity." Though at times merely repeating the explanation of Hobbes that in Mathematics alone have names a fixed signification, he at least suggests the point of view which was to be adopted and developed by Cumberland and Locke. "The knowledge we have of Mathematics," he remarks in one place, "hath no reason to elate us; since by them we know but numbers and figures, creatures of our own, and are yet ignorant of our Maker's¹." He does no more than barely express this antithesis between our knowledge of Mathematics and our knowledge of that Nature which we do not create but find; he makes no attempt to explain how by thus seemingly cutting ourselves off from reality we can escape the condemnation which he is ready to pronounce against building castles in the air.

Cumberland's Treatise *De legibus Naturae* was published in the year 1672, a couple of years after the famous meeting of "five or six friends," at which the necessity of an examination of the nature and bounds of human knowledge first forced itself home upon Locke. Seeing, however, that the *Essay* did not appear for another eighteen years, there was clearly ample time for the thorough assimilation of any materials that Cumberland had to offer towards the solution of its problem. Though purely ethical in intention, the work of Cumberland contains incidental references to the theory of knowledge, which bear considerable resemblance on many points to the theory of the *Essay*. Before proceeding to consider his relation to Locke on the question of the demonstrability of Mathematics and Ethics, it may be well to point out the extent to which there is a general agreement between the epistemological positions of the two writers.

¹ *The Vanity of Dogmatizing*, pp. 209-10.

At the outset Cumberland rejects the theory of innate principles. Not, indeed, that he is resolutely opposed to it like Locke, since he is willing to admit the possibility of a twofold origin of knowledge. The principles in question might, he thinks, have been born with us, and yet afterwards impressed upon us from without. The Theory of Innateness, however, seems to him an insecure foundation for natural religion and morality, seeing that it is rejected by many, while it is not susceptible of proof to those who deny the assumptions on which it proceeds¹. Instead of claiming certain first principles as an original gift of Nature to man, and basing his ethical theory upon this assumption, he undertakes to show that the highest truths of morality are necessarily suggested to the minds of men from the nature of things and of themselves², and are perceived and remembered by men as long as their faculties remain unimpaired. Thus, having stated and explained his supreme "Law of Nature," the rule of universal benevolence or regard to the common good, he proceeds: "I must now show both how the conceptions contained in the foregoing proposition necessarily enter the minds of men, and that when they are there they are necessarily connected, that is, that they constitute a true proposition³." Moreover, by doing so he thinks he can supply morality with that divine sanction of which it stands in need. For, the perception of such a self-evident proposition as that enforcing universal benevolence as the condition of the happiest state of each and all, is a strictly necessary effect; depending partly upon the laws of motion, in accordance with which impressions are made upon the organs of sense, and partly upon the nature of the mind, which cannot but apprehend the conceptions thus forced upon it, and their connection which constitutes the truth of the position. Consequently the proposition in question is at once "natural," and an expression of the will of God, who is both the first mover of matter and the efficient cause of the mind. It is evident, at once, from this crude attempt to prove the "naturalness" and truth of first principles by an appeal to a process of necessary causation, that Cumberland had not awakened even to Locke's consciousness of the unique character of enquiries into knowledge. Locke's ultimate appeal in the case of all general truths is to the self-evidence of the propositions themselves. We must remember, however, that to him, too, an enquiry into the "original" of knowledge seemed in some way a necessary preliminary to the determination of its "certainty and extent"; and that although his criticism of the

¹ *De legibus Naturae*. Prolegomena, § 5.

² *Op. cit.*, Ch. i. § 1.

³ *Op. cit.*, Ch. i. § 5.

theory of innate principles was in effect an attempt to substitute an immanent for an external criterion of knowledge, he was by no means aware of all that this involved.

Laying aside the possibility of an ante-natal source of knowledge, Cumberland describes its "original" in much the same manner as Locke. He appeals to the experience of all men as supporting him in recognising a twofold manner in which Simple Apprehensions are excited in our minds. "First, by the immediate presence and operation of the object upon the mind; in which manner the mind is conscious of its own actions, and also of the motions of the Imagination, or of the phantasms which appear to it. Secondly, by means of our external senses, nerves and membranes¹." These two sources of Simple Apprehensions he further refers to as internal and external Sensation. The mind, however, has faculties superior to these, among which he includes a peculiar power of forming universal notions by omitting the distinguishing accidents of things². Upon the possession of this faculty depends the possibility of Science and of framing rules of conduct which are unchangeable and consequently in a sense eternal³.

With Cumberland, then, as with Locke, the mind begins with Simple Apprehensions or Simple Ideas which refer either to external things without it, or to its own operations, and proceeds to form out of these materials the universal conceptions with which Science is concerned. For both, too, the subject-matters of Mathematics and Ethics are in a more special sense to be referred to the mind. It is the source, not only of the universality, but of the entire content of the ideas concerned. The mathematician is only directly concerned with ideal or mental realities, and does not assume the actual existence of anything corresponding to them *in rerum Natura*. Although Truth consists in conformity with things, Cumberland explains that certain mathematical propositions may be called true though nothing exists to which they are conformable. For since they do not make any assertion concerning things without the mind, they are not to be compared with them. Their truth consists in an agreement between the terms of which they are composed, and nothing more than this is to be looked for in their case⁴. Cumberland insists, however, that if such propo-

¹ *Op. cit.*, Ch i. § 5.

² *Op. cit.*, Ch. ii. § 11.

³ *Loc. cit.* Cf. the sense in which Locke explains the nature of "*Æternæ Veritates*." Bk iv. Ch. ii. § 14.

⁴ "Nec his obstat quod dentur propositiones quaedam Mathematicae, aliaeque his similis excogitentur, quae verae dicantur licet nihil existit, cui sint conformes. Hujusmodi quippe suppositiones, quia nihil pronunciant de rebus extra mentem, cum talibus non sunt conferendae, sed con-

sitions are to be regarded as possessing truth, it is only on condition that the terms of which they are composed are such that they are capable of at least an approximate realisation in Nature. If this condition is not satisfied the propositions in question are trifling¹. How we can be assured of the real possibility of their existence we are not directly told. We saw that the assumption upon which Locke proceeded was that when our ideas are thoroughly intelligible, the absence of inconsistency between them is a sufficient guarantee of the possibility of real existence conformable to them. Cumberland seems to lay stress, instead, on the dependence of mathematical constructions on human activity.

His aim, Cumberland tells us, is to construct a science of Ethics after this mathematical model. We do not presuppose the actual existence of the actions and dispositions of which the science treats, but depend upon the assurance that their realisation is at all events possible. We may thus demonstrate *a priori* certain propositions concerning Universal Benevolence, which are necessarily true, whether or not any one has ever adopted the Common Good as his end, and performed the actions which are necessary as means to its attainment².

Cumberland does, indeed, recognise certain obstacles in the way of the construction and application to practice of a perfect ethical code. On the one hand, there is the practical difficulty that since for the complete realisation of the ideal of a good which shall be at once the greatest possible good of each and all, the cooperation of others is essential, its attainment does not lie wholly within the power of any individual³. On the other hand, it would seem that there are cases so complicated that with our present limited insight we cannot even theoretically determine in complete detail what ought to be done⁴.

sensus tantum inter terminos, ex quibus fiunt, est quaerendus, in eoque veritas consistit earum." *Op. cit.*, Ch. ii. § 6.

¹ "Hae tamen nullum habent in vita humana usum, nisi aliquid extra cogitationes nostras reperiatur factum, aut a nobis fiat, quod nihilo (quod quidem consideratu dignum) a conceptibus animae formatis differat. Si earum subjectum, aut aliquid quam proxime simile non possit existere, nugatoriae sunt, et aequivoce tantum verae dicuntur." *Loc. cit.*

² "Eadem igitur methodo qua generalia Mathesiōs theorematum problematum constructioni deservientia liberantur ab incertitudine praefugiorum, quae fiunt de actibus contingentibus futuris, abstrahendo nempe ab affirmationibus de futura existentia talium constructionum, et demonstrando proprietates et effecta inde secutura (si quando fiant) visum est primo principia quaedam clara de effectis propriis, partibus, variisque respectibus amoris universalis tradere, nihil interim pronuntiando de ejus existentia; certus interea eo, quod possibilis sit, multa inde deduci posse, quae in praxi morali nos dirigant, quod theorematum praestant in possibile constructione problematum." *Op. cit.*, Ch. i. § 8. Cf. too the preceding section.

³ *Op. cit.*, Ch. i. § 8.

⁴ *Op. cit.*, Ch. iv. § 4.

These difficulties, however, he holds, have their parallels in Geometry. Curiously enough he finds an analogy to the practical ethical difficulty suggested, in the insolubility of a geometrical problem from insufficient data; while he compares the theoretical indeterminability of the right course of action with the practical impossibility of drawing a perfect figure.

Where pure geometry would fail, however, the analytical method may succeed. Ethics, Cumberland considers, should imitate this discovery of Descartes, "as the noblest pattern of science"; and he consequently endeavours to discover a connection between the methods of Ethics and Algebra¹. In Algebra, we seek to determine the value of an unknown quantity, which we express by a symbol, by means of its relations to known quantities. Similarly, in Ethics, we have at starting little better than a symbolical representation of the end of which we are in search, under the designation of the "Chief Good" or "Happiness"; and we only gradually come to discover the contents of this ideal which we have presupposed, by means of its relations to those human actions and faculties upon which it depends. We solve a complex equation in Algebra by singling out the known terms and determining by their means the unknown. The ethical problem consists in the identification of the end (all the good that lies in our power) with the means (our own actions); it is solved by first detecting the most obvious or easiest actions which promote the end, and from these proceeding to the more difficult².

We see then that Cumberland and Locke agree in holding that mathematical propositions are primarily concerned with mental constructions, but that they may nevertheless be denominated "true," or regarded as furnishing "real" knowledge, since we can somehow be assured of the possible existence of a corresponding reality. The two writers are again at one in holding that Ethics may be treated in a manner similar to Mathematics, while of the two Cumberland would appear to have been more fully alive to the special difficulties of the Ethical problem. For both, again, the recent application of Algebra to Geometry seemed to hold out hopes of a similar revolution in the theory of morals. The resemblance in these points between the views of Cumberland and the more fully developed theory of Locke, would of itself be sufficient to warrant the assertion that the latter was not arrived at in ignorance of the former. This presumption is intensified, and indeed rendered a practical

¹ Locke, also, expresses the hope that "Algebra, or something of that kind" may remove the difficulties arising from the complex character of moral ideas. Bk iv. Ch. iii. § 20.

² *Op. cit.*, Ch. iv. § 4.

certainty, when we find Locke referring to and answering a difficulty raised by Cumberland. For, after all has been said, Cumberland finds that there is a source of difficulty in Ethics which does not exist in Mathematics, and which renders the former science of necessity less capable of exactness. This obstacle arises from the circumstance that certain presuppositions of Ethics, *viz.*, God and man, their actions, and relations to each other, cannot be so accurately known as the presuppositions of Mathematics¹. "Nor let anyone object," writes Locke, "that the names of substances are often to be made use of in morality, as well as those of modes, from which will arise obscurity. For as to substances, when concerned in moral discourses, their divers natures are not so much enquired into as supposed; *v. g.*, when we say that 'man is subject to law,' we mean nothing by man but a corporeal, rational creature; what the real essence or other qualities of that creature are in this case, is no way considered. And therefore, whether a child or a changeling be a man in a physical sense, may among the naturalists be as disputable as it will, it concerns not at all the 'moral man', as I may call him, which is this immoveable unchangeable idea, a corporeal rational being.....The names of substances, if they be used in them as they should, can no more disturb moral than they do mathematical discourses: where, if the mathematician speak of a cube or globe of gold, or any other body, he has his clear settled idea, which varies not, though it may, by mistake, be applied to a particular body to which it belongs not²."

¹ "Fatetur interim in materia prudentiae moralis ea, quae dantur, seu ut cognita sumuntur, quae sunt Deus, et homines, eorumque actus, et relationes mutuae, non adeo accurate nota esse, ac ea quae in certa mensura seu quantitate dantur in Mathesi; ideoque quae ex iis colliguntur eodem defectu ἀκρίβειας laborare." *Op. cit.*, Ch. iv. § 4.

² Bk III. Ch. xi. § 16.

IV.—PHILOSOPHY IN ITS NATIONAL DEVELOPMENTS.

BY PROFESSOR KNIGHT.

THE Philosophy of the World is an organic whole, which has moved forward in uninterrupted continuity,—although not always at the same speed, or on the same lines,—from the first to the last stage of its evolution. What has occasionally seemed to the casual observer to be a break in its development, owing to the absence of visible links, has afterwards—when the missing links have been discovered—become part of a chain of evidence, demonstrating the unity of the whole process.

The theory of a continuous mundane development, creating by slow evolution those products, which are themselves destined to be superseded by new ones—in other words, the theory of “a perpetual becoming”—has grown in scientific clearness from the days of Heraclitus to our own; and is now accepted, with few dissentient voices, by those who have been initiated in Philosophy. But this doctrine of becoming is the theoretic interpretation of only one aspect of the universe. If “all things are double one against another,” what endures is as important as that which changes; and the Eleatic Philosophy is as true as the Heraclitic. Unity and variety together constitute the totality of existence; and each is necessary to the other. Paradoxical as it may seem, permanence lies at the background of every change; while perpetual change is the *conditio sine qua non* of all endurance.

To apply this generalisation at once to the subject to be discussed. In a certain sense, the whole Philosophy of the World is radically one. Being the outcome of a continuous cosmic process, operating in all lands, its problems are fundamentally the same; but, within each country, they differentiate themselves in detail. The surface variety has been necessary to exhibit the underlying unity, while the latter has been equally needed to unite the miscellaneous fragments in a single whole.

The truth embodied in the law of Evolution has proved, to

most thoughtful persons, that the numerous phases of opinion and belief, as well as the manifold types of national character which have arisen in the course of History, have in no single instance been matter of accident or chance. They have been due to radical, if not to racial, characteristics of Human Nature; and they are therefore likely to be as persistent as any of the types of organic structure, which the sciences disclose. The bent, or national tendency, of every people is due to myriad influences, which have played upon it from the dawn of time. These influences which have, in a subtle way, differentiated it from all others, are often occult, and underworking. They are not always known by those who inherit them from within, or receive them from without; and they are seldom visible to others. What becomes apparent in the recorded history of a nation is but a fragment of that which has gone to the formation of the national character. The latter has been due to the joint operation of causes both external and internal, and of forces which have worked beneath as well as above the stream of development.

This principle applies to all the elements which go to constitute the life of mankind. Like every other product, the Philosophy of the World has passed through multitudinous phases; widely different each from each in the amount of insight they have shewn, but all of them of value to the race at large. If the Literature, the Art, the Politics, the Social Life, and the Religion of the world together constitute a vital and organic whole—which differentiates itself here and there, because of the localities in which it works—its Philosophy is certainly no exception to this law of development. While there has been an organic unity operating underneath all change,—and even guiding apparent anomalies of form,—variety of aspect has been equally necessary; and the expansion of Philosophy throughout the ages has been due to the joint influence of them both.

If, however, the historian of Philosophy attempted to trace its developments from a cosmopolitan point of view, ignoring the differences of race and nationality, he would pass from country to country in a somewhat bewildering fashion. Organic differences would baffle him, in any attempt to trace the underlying unity, with a steady hand. It is therefore necessary not only to recognise, but to emphasise, the differences which now exist; and to trace them carefully in detail, while indicating their common origin. The old historians of Philosophy were, for the most part, mere chroniclers. They put down in their books a series of statements, more or less accurate, as to what this or that philosopher thought, or "held," or taught. These

recorded opinions were mere isolated *dicta*, chronicled in an irregular manner, with no attempt to trace their origin, their connection, or their influence. Others, since the time of Ritter, have tried to exhibit the course of Philosophy as one of organic growth; and all the numerous and noteworthy histories of it, which have been written in Germany, France, and England since Ritter's time—although their interpretations and criticisms may have been coloured by the particular school of thought to which the writer belonged—have adopted, more or less, the guiding principle of his book.

It has now become so obvious as to amount almost to a commonplace, that an adequate history of Philosophy can be constructed, only when the thought of the world is regarded as an organic whole; and when every phase of it—including those which to us of the 19th century may be grotesque, or even repulsive—receives its due, as the passing aspect of an underlying tendency. But, while every link in the chain is seen to be a real element in the cosmos—and some of the things which a mature civilization considers "least honourable" are nevertheless recognised as having contributed to the final result—it is absolutely necessary for the historian to take up nation after nation, *seriatim*; to deal with each of them individually, tracing those collateral influences which have come into it from abroad, as well as those which have reached it by direct inheritance within its own area.

It is easy to over-magnify the local influences which have shaped the Philosophy of a particular people; while the wider racial ones, underlying all provincial tendencies, are ignored. But, while many histories of Philosophy, since Ritter's time, have been compiled with the view of exhibiting the "increasing purpose" of the whole, few historians have tried to unfold the characteristics of each race, as an organic growth within its own domain, or province. I therefore think that it should be the aim of future historians to shew the fundamental differences inherent in each race—and *thus* to explain the local phases and peculiarities of development—rather than to emphasise the underlying unity of the thought of the world.

That there is a distinctive national colour, in all the great philosophies, cannot be denied by any competently informed person; nor can it be ignored in any adequate historical treatment of them. It is also important to note that a scientific examination of the provincial aspects of Philosophy is, on the whole, a return to precision, from the vagueness which a sense of the unity of the thought of the world is apt to engender. If we start with the cosmopolitan idea, and with the two main "streams of tendency"—the real and the ideal—and traverse

the centuries with their aid, setting down so much as due to idealism and so much to realism, we do not achieve much in the way of explanation, and we are apt to become nebulous and hazy.

Nowadays, when every one in the world is a sort of "next door neighbour"—when we have "thrown a girdle round the earth" in less than "forty seconds," and may soon be able to telephone to the very ends of the world—we are probably inclined to over-estimate the unity of the race. But there is no evidence to shew that acquaintance with other communities, and a knowledge of their distinctive features—knowledge which grows so rapidly in an age of scientific progress—will tend to produce greater uniformity of type, will lessen the differences which exist, or minimise the distinctive features of each man, woman, or child.

Besides, the abolition of its differences would be a serious loss to the world at large. Even were it possible, it would be a prodigious mistake to attempt to reduce the races of mankind to a dead level of uniformity, to europeanise the Indian, to asiaticise the African, to americanise the Polynesian, and so on. It would not only be a very wasteful policy to each of them while it lasted, but it would involve a serious loss to the world, were it even partially successful. What we need is the removal of every obstacle to individual and national development. Each race demands the freest possible evolution of opinion, character, belief, and action in all directions; "live and let live" being the law of the house, alike in individual families, and in mixed communities of men. Every extreme corrects, if it does not neutralise, the rest; and if the differentiation of the race be carried much further in the future, its unity instead of disappearing will become more and more apparent.

Within each nation, however, normal development proceeds from within outwards, not from without inwards. The higher culture must not be superimposed *ab extra*, it must be evolved *ab intra*. It must be reached by the slow processes of interior growth, and subsequent expansion. We cannot raise a people low in civilization up to a higher level, by thrusting upon it an alien type of life and culture, still less by making use of compulsion. We may graft, with the utmost skill, a new branch on the old stem; but, even in that case, the old will dominate the new, not the new the old. A conviction which is to last, and to bear fruit, must invariably proceed from within. If it is to endure, it must be educed; and that involves a long, and often a tedious, historic process. The result is very seldom accomplished by argument. It is much more

largely due to unconscious agencies than to conscious forces. It would seem to be the case that there must be a concurrent development of the physical frame and the animal functions, with an increase of brain-power, and a refinement of feeling; in other words, a growth of "the senses and the intellect" on the one hand, of "the emotions and the will" on the other, before any radically new manifestation of Human Nature can take place.

Another point of importance is this. The time during which the several races of mankind have already lasted has some bearing on the question of their probable duration. If the lower types began their career much further back, and have therefore a greater ancestry than the higher ones, it may be asked 'Have they none of the prescriptive rights of primogeniture?' In the physical cosmos outside of man we find organisms persistent for millions of years, and doing great service to the world; and it is most natural to ask why all the lower types of Human Nature should be uprooted, to make room for what we call (and rightly call) the higher ones; while every type is relative to a zero-point, from which they all have started, which gives us a standard for comparison, and by which the excellence of each may be appraised? We may surely ask, why all the lower races should be sacrificed for the good of the higher ones? And we may answer the question in the same way in which most humane persons object to the unlimited vivisection of our canine friends, for a remote possible benefit to the human race. Then, have we not found historically that the higher races have occasionally (and most righteously) been superseded by the lower ones, although only for a time?

More important it is to note that many persons who forsake a lower for a higher creed bring with them, and cannot help bringing, much that passed current in the lower; while the two cannot amalgamate. Many who abandon the customs of their country, who give up—it may be on conviction, or it may be through bribery—the faith of their ancestors, adopting a new cult, and becoming 'proselytes of the gate' at the instigation of the missionary, develop sundry vices in the course of the process. Any one who, on a sudden, accepts ideas which are not native to him, and practices which are not hereditary, becomes unnatural. He loses, rather than gains, by the process. Contact with the higher types of civilization has not always elevated the lower. It is so much easier for the latter to assimilate the vices, than to imitate the virtues of the former; and the healthy relation between the two, when they happen to be brought into contact, is not that the higher should force

its customs or practices, its Religion, or Government, or Philosophy upon the lower—still less that the lower should try to extinguish the higher—but that each should tolerate the other, and gain from contact with it, as much as it can healthily assimilate.

It follows that it is not only a weakness, it is practical folly for the votaries of any one type of civilization to act upon the principle "this is the best for all mankind." A system of belief or practice which is not indigenous—even although it is the outcome of a higher civilization, developing itself elsewhere—if transplanted to a foreign soil, is doomed to failure *ab initio*. If it seems to succeed for a time, its success is always more apparent than real; and in a vast number of instances, the reactions are stupendous. The reason is that the old currents of belief and practice, which were hereditary race-elements, continue to operate silently, underneath the new "stream of tendency." Differentiation is of course incessantly at work, never ceasing for a moment of time amongst any people: but the healthful changes are always slow and gradual ones, which do not record themselves at once. If written at the time, it is by a sort of invisible ink, which only becomes apparent after being subjected to the fire.

If, on this matter, we appeal to history—wisely recorded and interpreted—we find that, although it has been possible to *force* new laws, manners and customs, even a new Language, Philosophy, and Religion, on a conquered people, the success of the victor has been a deceptive triumph. The conquered people are crushed for a time. They are humiliated, perhaps made sullen by defeat; but they are usually ready for a fresh trial of strength, at the earliest possible opportunity. By the curious glamour of reaction from antiquated habit, what has been artificially introduced, even by conquest, may be welcomed for a time; and it is almost certain to be hailed by those who appreciate novelty; but the superior race, thrusting its latest ideals on one with which they have no constitutional affinity, may—by its sudden dominancy—destroy the native bloom of character and habit in the inferior people; while a subsequent reaction may drive the latter race to a lower level than that from which it was apparently but artificially raised.

It must be admitted that some crude developments, or diseased products, of our humanity may be dealt with at once by drastic processes; that is to say, by the rapid incoming of new, and at times of militant influence. Such an advent of beneficent power may legitimately extinguish, by its strong hand, the excesses of a rudimentary civilization; and humanity at large is the gainer by such a process of physical and moral

surgery combined¹. Nevertheless, in all cases of one civilization appealing to another, the transitions should be as gradual as it is possible to make them.

Even were it possible artificially to combine two races (a higher and a lower), as provinces can be territorially annexed, this would not prove either, first, that all the members of the lower were able to receive the higher type of thought, feeling and action; or secondly, that the higher might not be injured by receiving and assimilating the practice of the lower. If a higher race cannot intermarry with a lower, and have a progeny that is healthful, it is surely worse than useless to attempt a forcible intermarriage of ideas. But what is often aimed at is not the intermarriage of ideas, but the complete substitution of one set for another. It is the inoculation of the lower races, by the opinions of the higher; and the superimposition of the latter on the former, so as to raise them to a new level, by external means.

This applies not only to the African, the American, and some of the Asiatic races, but also to several European ones. Contact with the people of a different race amongst ourselves in the West, has often hindered rather than helped their development. The prejudices and the vices of the new race have been transmitted, and even intensified, more quickly than its virtues; while some of the dormant excellencies of the inferior people have died away in the process.

On the other hand, there can be little doubt that the introduction of a new type of civilization in the midst of an old one has at times touched the latter in its deepest parts. It has occasionally quickened the development of powers, which have been lying latent for centuries. What has at first seemed a disaster to a nation, which has lived for generations in a particular groove, and been there under the influence of a few provincial ideas, has afterwards led to more than a renewal of its youth. The introduction of elements, which have coalesced naturally with those which were verging to decay, has given a fresh lease of life to such a people; and here we reach the sole ground on which the work of the missionary of another creed who aims at being the pioneer of a new civilization can be defended. There is no limit to the influence which may be exercised by the higher races over the lower, if such influence be exerted naturally, and by wise methods.

Turning now from these semi-anthropological considerations, I reach the more strictly philosophical problem of the relation

¹ For example, infanticide, slave-dealing, the burning of suspected witches, cruelty to all who differ from you, etc. etc. might be dealt with, as every civilized people now deal with cannibalism.

in which the race stands to the individual, and the individual to the race—or of the many to the one, and the one to the many—in the matter of intellectual system-building. There is no doubt that the two factors in the historic evolution of the human race have been the power of the individual in leading the masses, and the power of the masses in controlling the individual. These two are complementary forces, centrifugal and centripetal. The power of the individual in determining a new forward movement amongst the mass of his contemporaries is quite as great as any power they can exert in restraining him from a too rapid, it may be a meteoric progress. When a community has sunk into a somewhat monotonous uniformity—whether of belief or of practice—when it has been working steadily on in the grooves of tradition, a longing, half understood at first, begins to arise within it for the appearance of a new Leader, for the guidance of an Individual, for the “Coming Man,” who will be able to focus contemporary wants, and to interpret them. In every corporate body—whether it be a State, or a Church, or a Philosophical School—there must be Leaders; and it is by the commanding force of its greater minds and wills, by their individuality and their special power, that all re-formations of opinion and practice are wrought out. The stronger have always given the law to the weaker—although it is also true, as a poet puts it, that “strongest minds are those of whom this noisy world hears least”: but to suppose that the great movements of History, and the formation of its chief Philosophies, or Social Institutions, have been due to the unconscious working of blind forces is as great a mistake as it is to ignore or undervalue the latter. The brain power of the individual has been a potent factor in the formation of every philosophical system, and it comes out in many ways. It is needed 1st adequately to understand the spirit of the age, 2nd to divine its latent tendencies, and appraise its underworking currents, 3rd to guide it onwards in a wise and fruitful manner, 4th to reconstruct and reinterpret ancient theories, by bringing them into vital relation with the present age, and 5th to sow the seeds of future development in a natural manner.

These, and many other points, might now be considered in detail; but as the aim of this paper is rather to urge the importance of the opposite and balancing truth of the influence of Race and Nationality in determining the great systems of opinion, an illustration of this thesis—founded on the contrast between Greek Philosophy, and its Oriental types—may be more appropriate.

Greece was the land of the ideal, in every sense of the

word; and there it was that the ideal was first made real to the human consciousness. The fascination which the race inhabiting that little promontory of the *Ægean* has exercised over the thought and the art of the world—over its letters, its science, and its politics—has had no parallel in subsequent history. While each nation has contributed its own share to the progress of humanity—and we may say in general that from the Semitic races we have inherited our Religion, from Greece our Philosophy and Art combined, and from Italy our Law—the Hellenic spirit has ruled the world in a manner altogether unique. This has been due to many concurrent causes. Perhaps the most remarkable feature, in the Greek world taken as a whole, is its manifoldness, and its manifold completeness; in other words the rapid development of the human intellect and genius, in many different directions simultaneously, and its perfection in each; so that the productions of Greece remain to this hour, the admiration and the despair of the world. No subsequent type of civilization has transcended it, so that the great Hellenic achievements remain in the very forefront of the world's development, even while an "increasing purpose" has been running through the subsequent ages. In the department of Philosophy, while the speculative thought of the world has of necessity changed, we find in Greece the germs of every subsequent theory; and, what is perhaps of still greater consequence, we find the later opinion of the world continually reverting to the positions taken up in the earliest Greek schools. There we find the teachings of Philosophy expressed with the greatest clearness and vigour, as well as subtlety, and we find its distinctive types more sharply defined, than anywhere else, until we reach the Philosophy of the last two centuries.

Another general feature in the Philosophy of Greece is the singularly rapid development and succession of its schools, produced by the active movements of thought within them. One system led on, swiftly and inevitably, to another; the existence of the latter being due to the very completeness which characterised its predecessor. This rapid succession of systems was not a symptom of intellectual decay, but of vitality. The quick absorption and assimilation of the elements which nourish the intellectual life of a people is a sign of sustained national vigour. And so, in marked contrast to the uniformity and stagnation which characterised the brooding East, Greece presents the spectacle of ceaseless activity, and incessant change.

This was doubtless due to the manifoldness of the life of the nation, as much as to anything else; and, (to what has been already mentioned) the intellectual reciprocity, or indebtedness of its Philosophy to its Art, of its Art to its Politics, and its

Politics to its Religion. Out of the friction of old ideas, and their incessant commingling, new ones emerged. In contrast with this, in the East where tradition for the most part ruled the national mind, it at the same time repressed and fettered it. There was no free play of thought, to break up the routine of the past, and to interfere with the monotony of precedent. If it was reverence that kept the Semitic mind perennially loyal to a few leading ideas, a certain intellectual timorousness—with languor, and love of ease, and other causes, due to climate, race, and temperament—kept the Eastern mind moving sedately, and at times austere, along the lines of immemorial tradition. There was no desire for change, no thirst for progress, no demand for liberty, such as we find in the West. Hence the uniformity which characterises the Mythology, the Art, and Government of the East, as well as its Philosophy. We find vastness, rigidity, and sameness. Where there is not repression, there is barbaric glitter, and monotonous splendour. The type of mental and moral character among all the Eastern peoples is for the most part the same. It is like the tropical vegetation, of more uniform feature than that which has been developed in the temperate zone. As some one—was it Hegel?—well remarked, the jungle is the physical type of the intellectual and moral life of the East; and it was the want of intellect—with its freedom and movement, its endless bright developments—that kept the East so stationary in Philosophy and Religion, as well as in Government and Art, and prevented the rise of the Sciences. A cumbrous and elaborate ritual overlaid the life of the people, with precepts and practices that fettered it. In contrast with this, it was perhaps due to the inherent vigour of the primitive settlers on the rocky peninsula of Hellas, and to the rapid mingling of diverse races—as wave after wave of emigration and of conquest swept westwards, and turned southwards, from the primitive Aryan home, wherever it was—that the world owes the singular union of flexibility and strength, of force, freedom and pliancy, characteristic of the Greek mind. In Greece, as in the East, climatic causes co-operated with racial tendency; and the physical features of the land—with their variety, and compact beauty—aided the development of national character. Greece was not the land in which Nature could subdue man, or dominate over him. It was pre-eminently the country in which man would become the interpreter of Nature; in which also he would be able to manipulate her forms, and be a deft and cunning workman in the idealization of them. It was not a land in which a doctrine of *nirvana* could possibly arise, or be appreciated. The active and subtle intellect of the people, and its æsthetic and athletic spirit combined, prevented this.

Thus, from the very first, the philosophy and the mythology of Greece differed from that of the East, and reflected the free creative intelligence of the people.

Another feature which characterised the literature and life of the Hellenic race, as well as its Philosophy, was its love of directness, its going straight to the mark, without intricacy, obscurity or twist. Abundant evidence of this is seen in the evolution of its philosophical schools. Its early infantile curiosity, and its subsequent youthful boldness, (often amounting to rashness), are evident; but intellectual thoroughness, and clear-eyed direct intelligence, are dominant throughout. Many of its early thinkers imagined that they had found a single key by which they could unlock the mystery of the universe at large; but, in these early schools, as well as in the later ones, we find an effort to pierce—by the sheer force of thought, as far as thought could carry—beneath the symbols that obscured it, and the metaphors that entangled it. Metaphoric conceptions ruled the East. They ruled the Semitic mind, and coloured the whole religious literature of the Jews, where anthropomorphic ideas had the upper hand. In Greece, on the contrary, from the very first, speculative minds sought to reach the shrine of pure Being, by the avenue of pure Thought. Vagueness, and even mystery, were abhorrent to them. The blue heaven above, and the bright sea around, suggested clearness, as well as depth; and depth without clearness was not esteemed in Greece. Hence vague suggestions were tracked, if possible, to their root; and were analysed, with a view to the removal of the vagueness, by a process of verification. The Greek did not naturally care for, or believe in, vague impulses which he could not name. Distrusting dim monitors within, the Hellenic mind wished that they should all be brought out of their lurking-places into the light, and that they should answer for themselves in the court of logical appeal. In this there was an element of weakness, as well as of strength; but the historical fact to be noted is that in the whole national life of Greece, we see a striving after *clear conviction*; and this love of light, and perpetual 'coming to the light,' may be said to have given rise to the long succession of its schools of Philosophy.

An equally significant illustration of the influence of Race and Nationality in determining the characteristics of philosophical thought, is to be seen in the modern German "stream of tendency," as compared with the French; and in the British stream, as compared with them both: but, as this may be discussed, if not in subsequent articles, in forthcoming books, it is for the present postponed.

V.—ON THE APPARENT SIZE OF OBJECTS.

BY W. H. R. RIVERS.

THE most definite experimental evidence in favour of sensations of movement as factors in spatial perception has in the past been derived from the experiments of Wundt⁽¹⁾ on the monocular estimation of the distance of a thread. Hillebrand⁽²⁾ however has recently shown that Wundt's results probably depended, not on movements of accommodation and their accompanying sensations, but on other factors, especially alteration in the size of the thread. On the other hand, as Dixon⁽³⁾ has pointed out, Hillebrand's experiments hardly justify him in concluding that movement factors are wholly without influence on the sense of depth.

I have investigated some other phenomena which have been held to prove the influence of movement, and especially of accommodation in spatial perception, and I consider one of them in the present paper, *viz.* the alteration of the apparent size of objects when the accommodation apparatus of the eye is paralysed by atropin.

One of the first to record this phenomenon was Donders⁽⁴⁾, and his explanation is still generally accepted. He noticed the appearance especially when the ciliary muscle was only partially paralysed and supposed the effort necessary to see an object distinctly was greater than normal; that the object was in consequence supposed to be nearer, and that as the visual angle had not become greater, there was an apparent diminution in size. The condition was more fully investigated by Förster⁽⁵⁾ and Aubert⁽⁶⁾, who noticed that an object appeared not only smaller but more distant. They explained the micropsia on the same lines as Donders, and supposed that the appearance of greater distance was due to a secondary inference from the known size of the object. A similar appearance is often observed as a symptom of paralysis of the third nerve from disease and has received the same explanation.

My own observations have led me to the conclusion that

under the influence of atropin micropsia may arise from two wholly distinct causes. Under certain conditions an object may appear to be diminished in size when looked at directly; under other conditions an object beyond the fixation point appears small, and these two appearances are of very different nature. I shall refer to them throughout as micropsia at the fixation point and micropsia beyond the fixation point respectively.

The phenomenon observed by Förster and Aubert was micropsia at the fixation point, and I will consider this first. Förster found that with partial paralysis of one eye by atropin Jaeger's type appeared smaller to this than to the normal eye, and that diminution in size increased as the type was brought nearer to the eye up to a certain limit. Both far and near limits of the region in which micropsia occurred varied in different individuals depending on the condition of refraction. Aubert saw No. 4 Jaeger at 7 inches only half as large as to the normal eye.

In repeating these experiments I dropped a solution of homatropin (one grain to the ounce) in the left eye. At the end of 20 minutes Jaeger's type appeared distinctly small with this eye when fixed directly. I am myopic, ($-3 D$ in the vertical meridian and $-4 D$ in the horizontal), and the far limit of the micropsia was 20 cm.: the decrease in size became more marked as the type was brought nearer to the eye, so that at the nearest point where the type could be focussed No. 10 to the left eye appeared nearly as small as No. 6 to the right eye. On trying squares of paper of different sizes, I found that while black squares on a white ground showed marked diminution in size, no such change occurred in the case of white squares on a black ground; these looked even rather larger to the left than to the right eye. Mr E. T. Dixon (emmetropic) kindly made observations for me under homatropin. He observed Jaeger's type smaller with the affected (right) eye from 100 cm. up to 40 cm. No. 10 to the right eye appeared smaller than No. 8 to the left eye. A black square on a white ground appeared smaller, a white square on black ground rather larger to the right than to the left eye. The change in size observed by us was evidently due to irradiation, and as might be expected printed type is a very favourable object for showing the effects of irradiation. It became probable that this form of micropsia depended rather on the dilatation of the pupil than on affection of accommodation and this was proved by the further observation, that with a small artificial pupil before the affected eye no micropsia was observed; the type was equally large to either eye.

Förster gives several reasons for his belief that the micropsia observed by him was due to the change of accommodation and not to the pupil. His three observers did not notice the micropsia till from 30 to 80 minutes after instillation, although the pupil had dilated earlier. I observed micropsia after 20 minutes, and it was well marked after 25 minutes. Förster also noticed the micropsia especially with strong effort to accommodate and together with lessening or disappearance of blurring, and regarded this as proof of its dependence on the accommodation. He does not appear however to have tried the effect of an artificial small pupil, and he only describes experiments with Jaeger's type.

I have found that the same process of irradiation explains another alteration of apparent size which I have observed. Some time ago I noticed that objects and especially printed letters appeared slightly smaller to my left eye than to my right; the difference was very slight and was only detected when the object was doubled by looking beyond it so that I had my right and left eye images side by side for comparison. There is a very slight difference of refraction between my two eyes and it occurred to me that in cases of marked inequality, there might be a decided difference in the apparent size of objects to the two eyes. This I found to be the case. In one case the apparent difference in size associated with a difference of 2 D in refraction was so considerable that No. 10 Jaeger to one eye appeared only as large as No. 6 to the other. In the early cases I examined the micropsia occurred with the relatively more hypermetropic eye and I supposed that it was associated with the greater effort of accommodation necessary to see an object distinctly. Since making the experiments with atropin, I have reexamined some of these cases and found the appearance to be due to irradiation. In the case I have already mentioned a black square on a white ground is considerably diminished in size, but a white square on a black ground is not appreciably altered. With an artificial pupil of 1.5 mm. diameter before each eye, the difference in size was less marked but still present; with a pupil of 1.5 mm. before the hypermetropic eye and one of 2 mm. before the normal eye, no difference of size was observed.

One form of micropsia which occurs under the influence of atropin appears then to be due to dilatation of the pupil, and so far as this form is concerned, there is no evidence in favour of accommodation as a factor in spatial perception. The other form which I have called micropsia beyond the fixation point is of more interest psychologically. It is an appearance of the

same nature as one which may be observed with the normal eye. If one eye be closed, the other fixed on a near object, and at the same time a distant object observed, the distant object will appear to decrease in size if the fixed object be brought nearer to the eye; when the fixed object is moved away from the eye, the distant object will appear to increase in size. Similarly an object nearer than the fixed object will appear to increase in size when the fixed object recedes from the eye, and to decrease in size when the fixed object approaches the eye. The appearance may be well observed with Jaeger's type. If this be held at ordinary reading distance and a nearer point be fixed the type will appear smaller; on bringing the fixed point nearer, further diminution will take place and the micropsia may be so marked that No. 10 may look as small as No. 4 or even No. 2. At the same time the type becomes blurred, which interferes to a certain extent with the illusion. Enlargement of the type nearer than the fixation point is less easy to observe but does occur. These appearances may be summed up by saying that objects beyond the fixation point appear smaller and objects nearer than the fixation point larger than they would do if fixed directly. One apparent exception occurs to this; if type is brought quite close to the eyes within the near point, it appears slightly diminished in size. This diminution however entirely disappears with a small artificial pupil, while the micropsia beyond the fixation point is not affected by this means. These appearances have been previously described by Ludwig⁽⁷⁾, Panum⁽⁸⁾, Hering⁽⁹⁾, Stumpf⁽¹⁰⁾ and Martius⁽¹¹⁾. I will reserve their explanations till after I have described some further observations.

The apparent diminution in size is in the case of most observers, and among them myself, accompanied by an appearance of greater distance; a few on the other hand have had indefinite ideas of distance and have seen the object sometimes nearer, sometimes farther. I need hardly say that in all cases where I have asked for observations I have avoided leading questions. To myself change of distance is occasionally more obvious than change of size; after fixing a near object and then suddenly releasing accommodation I have seen an apparent approach of the distant object, and this has been especially well marked in cases where I have been attending to the question of size and have not been thinking of change of distance. The question arose whether the apparent change of distance was secondary to change of size as supposed by Förster and Aubert in their explanation of the micropsia of atropin. To determine this point I tried some experiments in which I was

unaware of the size and distance of the object. I looked through an eye-piece at one end of a cylindrical box at a uniform grey wall; a point to be fixed was placed within the box: the point being fixed, squares of paper of various sizes were held by means of a slender holder at various distances between the box and the wall by an assistant. It soon became obvious that knowledge of the size was a very important factor in the case; in nearly all cases however the square appeared either smaller or more distant or both smaller and more distant than when fixed directly, and Mr E. T. Dixon also tried this experiment with similar results.

I will now describe the experiments with atropin. I applied a solution of atropin sulphate (2 gr. to the ounce) three times a day for four days. The appearances to be described were present during the whole time. Owing to my myopia I could see type distinctly without glasses at about 25 cm. Holding the type at this distance, I fixed the point of a pencil in front of the type and brought it nearer to the eye, making an effort to accommodate for the point. The effort was of course unsuccessful and the point of the pencil became more and more blurred as it approached the eye. At the same time the type diminished in size just as in normal vision, but owing to the absence of blurring the diminution in size was more obvious than with the normal eye till with near approach of the pencil No. 10 appeared quite as small as No. 2. With the diminution in size there was an appearance of greater distance as in the normal experiment, and the phenomenon appeared to be identical in nature with the normal micropsia beyond the fixation point, but more easily observed owing to the absence of blurring. In an emmetropic individual it is to be expected that the experiment would succeed only with distant objects, and it seems possible that one cause of the micropsia which has been observed clinically by ophthalmologists may have been a want of correspondence between a seen object and the point of fixation. Under ordinary circumstances it is a phenomenon which will only be observed if it is looked for.

Another drug with which I have experimented is eserine. This causes spasm of the ciliary muscle and with this condition objects appear increased in size. I used a solution of eserine (1 in 320) to the left eye. At the end of ten minutes, my far point was brought down to 15 cm. Type was distinctly larger to the left eye at 15 cm. and increased further in size on bringing nearer to the eye, so that No. 10 became larger than No. 12 to the right eye. Five minutes later the far point was at 10 cm., and the macropsia more marked, No. 10 to the left eye being almost as large as No. 14 to the right eye at

the nearest point where it could be seen distinctly¹. The macropsia began to pass off before the end of an hour and had disappeared three hours after instillation. Apparently the macropsia occurred both at the fixation point and nearer than the fixation point, but much more marked when nearer. During the first hour, however, any effort to accommodate was decidedly painful. The ordinary explanation given of this condition is on the same lines as that of micropsia; that owing to the spasm of accommodation, no effort or less effort than normal is necessary to see an object distinctly. This gives rise to an idea of greater distance and consequent appearance of greater size. I may mention here that the increase in size was very much greater than would have been due to the contraction of the pupil due to the eserine.

The explanation of micropsia beyond the fixation point is a much more difficult matter than of that at the fixation point. I have satisfied myself that it is not due to irradiation. The experiments under atropin would be sufficient to disprove this, marked micropsia occurring with effort of accommodation unaccompanied by alteration in the pupil or dioptric apparatus. This form of micropsia also occurs with a small artificial pupil and is present for a white object on a black ground as well as for black on white. The first to observe the phenomenon, Ludwig⁽⁷⁾, was unable to suggest an explanation. Panum's⁽⁸⁾ explanation was similar to the ordinary explanation of the micropsia of atropin. He supposed that there is an illusion of judgment having as its sensory basis the peculiar feeling of the sensation of accommodation and that the idea of nearness or farness so arising is translated by an instinctive process into a judgment of size. He suggests however the possibility "that the mode of sensation of the visual organ as regards distance is changed in an unknown and incomprehensible manner by the nerve excitation which accompanies accommodation." Stumpf's⁽¹⁰⁾ view resembles very closely that of Panum. The phenomenon is also mentioned by Martius⁽¹¹⁾. He describes an object beyond the point of fixation as shortened by perspective and he refers the phenomenon to apparent localisation at the fixation point.

More satisfactory is the explanation given by Hering⁽⁹⁾. He supposes that the appearance is due to a change in the mutual relations of the near and far objects. If the hand as the near object is brought nearer to the eye, the change may be perceived as an enlargement of the hand or as a diminution in

¹ Berry states (*Diseases of the Eye*, 1893, p. 24) that accommodation macropsia increases with removal of the object from the eye. My observations showed a marked increase with approach to the eye.

size of the distant object, according to the direction of the attention to the distant or near object respectively; that when the hand is near the eyes and is yet perceived as of the same size as previously at a greater distance, the distant object will be measured by a different standard; that the retinal image will be multiplied by a smaller factor. This explanation however does not wholly meet the case. Objects beyond the fixation point may appear smaller when there is no measurable near object for comparison. Then if a sheet of paper be held before the eye and its edge fixed, a distant object will appear to diminish in size when the paper is brought nearer, although the near object has been a separating line which has not altered in size. Still more convincing is the objection that the micropsia occurs when an imaginary near point is fixed and then an effort of accommodation made for a nearer point in space.

Hering's explanation needs some modification and then seems to me to meet the case. In his theory of binocular vision Hering distinguishes between localisation relative to the fixation point and localisation of the fixation point itself, and the same distinction may be applied to monocular vision. He regards the fixation point at any moment as the centre of the visual space (*Kernpunkt des Sehraums*) at that moment. With alteration of the fixation point, the relation of a stationary object to the visual space as a whole will be altered. If a point be fixed and an object beyond be moved farther away from the eye, the object will appear more distant and smaller. If the fixed point be moved instead of the object, the object appears more distant and smaller. It is the relation of the object to the fixation point and not to the eye which determines the apparent size and distance. The retinal image has remained constant, but, as Hering says, it is multiplied by a smaller factor with greater distance from the fixation point. Similarly if the fixation point recedes from the eye, a distant object appears to have approached the eye and to have become larger; the retinal image is multiplied by a larger factor with decreased distance from the fixation point. The same holds good of objects nearer than the fixation point; it is the relation of the object to the fixation point and not to the eye which determines its apparent size and distance. It may be objected that this explanation is little more than a restatement of the facts of the case. It is however a restatement which emphasises the importance of the fixation point as the centre of the visual space and as the determining factor of the apparent relations within that space.

Further, this explanation is of interest in relation to the problem mentioned at the beginning of this paper. So far as

localisation relation to the fixation point goes, there is no evidence that the alteration of spatial relations is in any way dependent on accommodation. It is in the localisation of the fixation point itself that this may play a part, and in this connection the atropin experiments present several points of interest. In the normal experiment, the localisation might have as its basis the sensations arising from the peripheral accommodation changes. In the atropin experiments the same phenomena appear in the absence of any peripheral accommodation, and this seems to point to the fact that the localisation of the fixation point depends altogether on central factors. Several objections may be brought forward; first, that the ciliary muscle was not completely paralysed. It is not easy to say that the power of accommodation is completely abolished, but the appearance occurred after the application of atropin for four days, and I was unable to detect the existence of any accommodation. I used fine hairs stretched across a hole in a card. I could only see the hairs clearly at one distance; vertical hairs at 25 cm., horizontal at 32 cm., and when the hairs were slightly blurred I was unable to make them distinct by any effort of accommodation. A second possible objection would be that the localisation depended on associated movements. If I had only paralysed one eye, the localisation might have been explained by contraction of the ciliary muscle of the opposite eye in the same way that G. E. Müller⁽¹²⁾ and James⁽¹³⁾ explain erroneous projection with paralysis of an ocular muscle. I excluded this by using the atropin to both eyes. A further possibility however is that the localisation depended on associated movements of convergence, of eyelids, etc. On making the efforts to accommodate, I experienced distinct sensations of tension referable to the eyeball and parts around as generally occur with strong accommodation effort, and it might be urged that localisation depended on sensations arising from these peripheral conditions. If this were the case, it seems unlikely that the changes of apparent size and distance associated with the effort should have been in no way lessened, and in fact even increased by removal of the share taken by the ciliary muscle. I regard these experiments as going far towards proving that the localisation of the fixation point depends on central factors, and I may record an observation which bears out this view. In trying the experiment with the normal eye, I have seen type beyond the fixation point much diminished in size but yet distinct and well defined; the accommodation apparatus must have been adapted for the type, and the micropsia due to central conditions.

The problem is from one point of view a special case of the

general question of the sense of effort. Those who advocate its central origin usually speak of sensations of innervation or of consciousness of the outgoing impulse. The atropin experiment seems to show that the effort alone to carry out a movement may produce a sensory change of the same degree of vividness as occurs when the effort is followed by the movement.

I have throughout described micropsia beyond the fixation point as a monocular phenomenon. According to Martius it may be observed with both eyes. I think that this is the case, but the observation is not satisfactory owing to the double images. With distinct double images beyond the fixation point I have not been able to satisfy myself that micropsia occurs; certainly it does not occur to the same extent as with one eye. There is, however, a binocular phenomenon which is possibly of the same nature, *viz.* the apparent small size of the binocular image of two objects combined by converging the eyes for a point nearer than the objects. The smaller size of the combined image is in my case associated with an appearance of greater distance and the phenomenon may be regarded as an instance of micropsia beyond the fixation point. One appearance, however, which does not fit in with this view is that the lateral monocular images are not appreciably diminished in size. The apparently large size of the binocular image of two objects combined by diverging beyond the objects may also be of the same nature as the monocular phenomenon.

As regards the eserine experiments, I am inclined to regard the increase in apparent size as an example of the normal macropsia nearer than the fixation point. The whole region in which the type appeared large was well within the ordinary reading distance. It is possible that the enlargement at 15 cm., the far limit of distinct vision may have been due to the diminished size of the pupil and diminished irradiation compared with the sound eye, and it is possible that the increase in size on bringing the type nearer was directly due to the increase in the size of the retinal image, the accommodation apparatus and fixation point remaining stationary. The pain produced by any effort to accommodate rendered the observation unsatisfactory, and may also have tended to keep the fixation point beyond the object.

I have endeavoured in this paper to show that at least two kinds of micropsia may be observed as the result of the action of atropin on the eye; that one, probably that most commonly observed, is due solely to irradiation, and depends on dilatation of the pupil and not on paralysis of accommodation; that the other is a phenomenon of normal vision which may be observed

more easily under atropin, and that this second form lends no support to the view that peripheral accommodation changes are factors in spatial perception.

It must be a matter for future investigation to determine which kind is present in the cases which have been reported clinically, and the possibility must not be neglected that micropsia may occur under atropin from causes other than those I have described.

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VI.—DISCUSSIONS.

THE 'TYPE-THEORY' OF REACTION.

IN the Oct. No. of *Mind* Professor Titchener devotes some pages to a very discriminating examination of the recent 'Study' of mine in *The Psychological Review* (May, 1895) in which I stated in some detail a theory—announced some time earlier—to explain the variations shown by different reagents in the time of their reactions. His statement of the question is so full and his quotations of my statement of it so generous that I need not now do more than refer the reader to his article, or to mine, for the preliminaries. I may also waive all discussion as to the method of science in general and the nature of proof—matters of a kind that we either agree upon or would probably continue to disagree upon. All such machinery out of the way—and I cannot help thinking that Professor Titchener sometimes allows the dust of his machinery to obscure his vision—I may be allowed to state a point or two, first on his article, and afterwards on my theory.

1. The first point made is this: that I was wrong in calling the 'disposition' or '*Anlage*' view a 'theory.' That, certainly, is true; and I claim, as Professor Titchener grants my right to, that my theory goes farther, in attempting to give a psychological explanation of reaction rather than a simple statement of fact.

2. Professor Titchener's explanations regarding what he calls the *Anlage* of the reagent, and the quotations from the works of others on the same point, still seem to me, in spite of the 'four-fold root of sufficient reason' which he presents in numerical order, to be open to my original charge of *circulum in probando*. He says, first, that, in Lange's words, "there are certain persons who are incapable of reacting consistently in the sensorial or muscular way." This I not only admit, but expect as a natural circumstance, if the truth be what my theory says it is. The man of the sensory type, my case of *F*, for example, complained of just this difficulty: he found himself almost incapable of reacting in the muscular way, being a musician and a man of the auditory type. Is it better to explain this man's condition, first finding out about him all that we can, or to drive him out of the laboratory? Then, under the same heading, Professor Titchener cites Wundt's version of the same incapable man in these words: "there are individuals

who are entirely incapable of any steady concentration of the attention." This I also admit—the asylums are full of them—and I also admit that they are better out of the laboratory. But this is a very different class from those persons described by Lange; and it is just the confusion of the two kinds of people that makes Mr Titchener's whole position a false one. I find that my case *F*, if I am patient and do not turn him out too hastily, shows a remarkable power of concentration of his attention upon sounds: he can beat all the laboratory besides at that. And in other directions his attention is very fine. He is, in fact, a high-stand man in his university-work generally. So he is in no sense one of Wundt's class who are incapable of any steady concentration of the attention. On the contrary, he can concentrate his attention splendidly, provided we allow him to do it his own way. Assuming then that Wundt stated just what he meant, I quite agree with him; provided his usage go no farther than his words. But coming to the question of usage in the Leipsic laboratory and speaking only by the book, we find these words in Professor Titchener's article in Wundt's *Studien*.

After saying that his results ought to be published: "Weil die Zahlen auf einer strengen Durchführung des zwischen den sogenannten sensoriellen und musculären Reactionen existierenden Unterschieds beruhen, und daher theils Abweichungen von den früher erhaltenen Zahlen aufweisen, theils zur Erklärung der innerhalb dieser vorhandenen Unregelmässigkeiten dienen können," he goes on to report: "Mitarbeiter in diesem Theil der Untersuchung sind neun Herrn gewesen. Sichere Resultate habe ich jedoch nur von zweien ausser mir selbst gewinnen können." (*Phil. Studien*, viii. s. 138.)

Now, does Mr Titchener mean to say that these three alone of the nine were capable of any 'steady concentration of the attention'? If not so, then where are the six? Are the six 'incapable of introspection,' as another of Professor Titchener's authorities is quoted to have put it? I happen to know about some of the six, and can say that the average ability of the patrons of the Leipsic laboratory is not as low as this procedure would seem to indicate. So Professor Titchener is not following Wundt's formula of exclusion; he is rather following his own and Lange's formula, and by it excluding all who are 'incapable of reacting consistently in the sensorial or muscular way.' If one-third of mankind are to be taken to prove that a result is a universal principle, the rest being deliberately excluded because they cannot get the result that the one-third do, then what conclusions could not be proved in well-managed psychological laboratories? It would be interesting—indeed it would be the only possible justification of the procedure—to have the partial results which the other two-thirds did give, with the criticism of them on the ground of which they were thrown out.

3. Mr Titchener then says that my charge that the "Leipsic

school 'rules out' results which do not accord with the Leipsic theory, but are nevertheless constant and regular results, is altogether unfounded"—quoting passages again from Leumann and Külpe to the effect that due regard should be had to individual differences among reagents. The only results ruled out, he says, 'are those which are wholly irregular and inconstant.' To this I have two replies to make. First, I may ask: if this be true, why does not Mr Titchener accept the results of Flournoy, Cattell, and myself, which show tables of cases whose reactions were as regular and constant as the Leipsic results, but which fail to show the sensorial-muscular relation which the Leipsic school believe in. I shall say a word more on this question of relative accuracy of result farther on. And second, Professor Titchener overlooks one of the essential factors in the case—the factor in the case, to wit, that relative regularity and constancy may be just the thing we are observing. Results may be *regularly irregular*: and that is just the contrary case to the one which he looks exclusively for, *i.e.*, the case of results which are *regularly regular*. In ruling out all results which are irregular, the Leipsic school beg the question. In matters of the attention it is evident that steadiness, uniformity, ease of fixation, is the opposite of hesitation, now-good-now-bad, easy-then-difficult, effects. And it is just a part of the phenomenon that my theory attempts to bring to recognition, that the case in reaction is exactly this normal and common kind of variation. Irregularity, therefore, may arise from difficulty in getting the required image or content held up for attention. And I think that the Leipsic school have to recognise and act upon the same principle as soon as they come to ask for the slightest shadow of explanation of their own distinction between the two kinds of reaction. In short, to put my position briefly on this point, I should say that irregularity of result might occur—and we actually have cases of it on each side—in either kind of reaction, and if one should determine beforehand to rule out all cases of such irregularity of the muscular kind, then he might find one-third of his cases remaining to serve as basis of a formulation *exactly the opposite* of that held by the Leipsic school.

I have, further, to thank Professor Titchener for quoting the passage from Külpe to the effect that "if a person is incapable of any vivid ideation of a sense impression, he will give the appropriate direction to his attention by the formation of a corresponding judgment, or by help of the organic sensations arising from the strain set up in the organ of sense or of movement, or perhaps by visual ideas of the stimulus or of the required movement. But it is probable that certain differences in the determination of reaction times are largely referable to the differences in the form of expectation." This is my view. It is only another way of saying that these things should be taken into account, and that all variations in individuals should be counted. Professor Flournoy's case is especially valuable as enabling us to follow up one of the variations

which Külpe hints at; and my research into the variation between 'visual motor' and 'kinaesthetic motor' reactions is a deliberate attempt to clear up one of these distinctions. Külpe wrote in the same passage: 'so far there has been no accurate discrimination of all these forms of muscular and sensorial preparation.' How then, I may ask, can he say beforehand that the muscular form will turn out in each case to be shorter than the sensorial? One of the merits of the 'type-theory' is just that it gives us natural lines of advance along which to direct these further investigations.

4. When, therefore, Professor Titchener says that my "demand for a statement of the origin and meaning of the 'disposition' is a demand for the impossible," I have only to cite certain practical considerations to meet his views as to the intrinsic obscureness of 'nurture, of heredity and education,' as far as this topic involves those things. Is not the fact that *F* is a musician, something of an explanation of his auditive 'disposition'? Is not the fact that a man having certain defects of vision has also difficulty in giving visual attention, in so far a reason for his long visual reaction? Is there not now a mass of pathological evidence proving that movement of a limb may be impossible if visual, auditory, or other types of attention cannot be brought into play? And is not this in so far the ground of a theory of the variations which these men show when they are well? In short, is not the pathological theory which I have used in working out the 'type-theory' of reaction just a theory of the variations produced by 'nurture, heredity, and education'? But even if, theoretically, 'dispositions' are obscure, we should be sure that we have 'caught the rabbit' before we decide that he is not worth cooking; and this is the task which the 'type-theory' sets itself—to investigate the so-called 'dispositions' and find out what they really are.

Professor Titchener then goes on to examine the evidence upon which my theory rests. I may say before taking up the points which he makes, that I by no means admit the implication that I have anywhere stated all the evidence in what I may call the form of a catalogue—as he is fond of doing; on the contrary, the article he quotes is mainly the report of a research, and the general considerations are very schematic. I hope later to do more justice to the evidence as a whole. So I shall now only comment on the evidence as he states it, not as I should state it.

1. He objects to my cases on the ground that they were not tested to their type. Now, in spite of Mr Titchener's assertion that 'there are many methods of testing type,' I may say that I do not know of any that are conclusive except those of introspection and pathology. I believe that in most cases a very safe conclusion can be reached by questioning the subject in a variety of ways, *i.e.*, by using the method of introspection. This I have done with my cases, and it is only a phase of the incompleteness of my article, when looked at from a 'catalogue' point of view, that I did not state it. Professor Titchener is quite right in asking for it; and

later I shall furnish it. He would do psychology a service, however, if he would publish some of the 'many methods of testing type, apart from the reaction method.'

2. He says of my results: "four persons reacted to sound. Two of them, *B* and *S*, carried out the investigation of which the present 'Study' is a report: presumably, therefore, they had the type theory in mind throughout. Whether the other two reacted with or without knowledge, we are not told. The greatest reliance is placed upon the times of *B* and *S*." Of this I have again two things to say: first, that the research was carried out largely in Toronto at the time when I (*B*) still accepted the Leipsic distinction as a general one; and my present theory was arrived at only after I had subsequently secured the results reported in the table of *F*, and largely on the basis of that table, which forced me to alter my former view. This shows for itself in the tables, in both my case and that of *S*—he too had no such theory when he gave the reactions—for we are the *very two* who do not contradict the sensorial-muscular distinction! What Mr Titchener means by saying 'the greatest reliance is placed upon the times of *B* and *S*' passes my comprehension. As also any ground he may have for the unhandsome charge that I have changed my reaction-times since I wrote my book on *Senses and Intellect*. It looks to me like a case either of the extremest carelessness as to self-contradiction, or of 'bluff.' Of course I do not accuse him of the latter: but why strain to make a point which is contradicted by the table which he himself constructs out of mine? It can only deceive the non-elect. My results still show the Leipsic distinction as they always did; so do Mr Shaw's (*S*). Mine have only changed in that the distinction is less marked than it used to be; and this I go the trouble to explain in the same article as probably due to habit and practice—as my theory again seems at least not to contradict. The times of *B* and *S*, therefore, are very neutral to the discussion: that of *F* and, as far as examined, that of *T*, are the ones on which 'greatest reliance' is placed—of all which I have myself investigated.

3. Now as to accuracy of result—the point which comes up next. Professor Titchener criticises my tables as to certain results which show variation, quoting only the figures for *B* and *S*. 'These variations,' says he, 'call for special explanation.' Yes, they do; and I can give it. But as I have said, these are the two cases which have no great bearing on the discussion—a kind of citation which, if I were criticised by one whose standing I did not know, I should say showed incompetency or playing to the galleries. The two cases which are important to my argument and which go with those of other observers to prove the 'type-theory' are those of *F* and *C*, as I may again repeat. In the case of *F* the difference between the sensorial and muscular reactions is 40σ and in that of *C* it is 25σ . Is it competent argumentation, in view of these figures, to say: 'Professor Baldwin argues from time-differences (22,

18, 21 σ), with no shadow of reference to the other cases, especially after declaring, without any accuracy, that I placed 'greatest reliance upon the times of *B* and *S*.' The only possible point in my article to which such criticism would apply is the distinction between 'visual motor' and 'kinaesthetic motor' reactions, where I do use the results of *B* and *S*. But that is quite another topic; and while to have confused the two may, in a measure, excuse Professor Titchener's error, it is, I am bound to say, most unfortunate. For in that case, how can Professor Titchener go on to say: "Nevertheless it must be admitted that the tables show some striking results, and that the construction of the type-theory out of them is very ingenious." This would seem to show that the writer of the sentence did see the bearing of the times of *F* and *C* after all, and yet did not cite them in his quotation of figures.

4. Flournoy's case. Professor Titchener gives the details of this case sufficiently. He dismisses it with these words: "All that they [*i.e.* the Leipsic school] would say is that the 'physical possibility' to react muscularly is not, in [our] laboratory experience, a feature of the normal or average mental constitution. Consequently, the mind so constituted cannot be drawn upon to furnish norms of reaction: however interesting its workings may be in other connections." This summary exclusion of cases has been spoken of above. So far from disposing of the case it shows, in my mind, the plainest confession of inability to do anything with it. It amounts to saying: 'this case was investigated; it ought not to have been investigated: the results were published; they ought to have been suppressed.'

Other cases are then taken up, *i.e.* those of Professor Cattell, from whom a letter is cited quoting his two reagents *J* and *D*. Cattell says that *D* supports the type-theory, and that *J* gives no difference between the two kinds of reaction—a fact which, of course, fails to support the Leipsic distinction. Professor Cattell then gives a case (unpublished) of a reagent who gave a slower reaction for sound than for light while distracted 'by not knowing where the sound was.' When this cause of distraction was removed 'his reaction (to sound) became much quicker and more regular.' Cattell says this case 'supports your (Titchener's) point of view'; and Professor Titchener, on the ground of this common phenomenon of distraction of attention, dismisses the evidence from Professor Cattell's cases with the phrase 'honours are divided.' Professor Cattell, on the other hand, in the same letter declares in favour of the type-theory in these words: "My own idea is that an unusual direction of the attention lengthens the reaction time, and that when the reaction has been much practised it becomes reflex." If Professor Titchener can get any comfort from the unpublished case mentioned, it is well, but to me it seems to be quite easy of explanation. The person is uncertain what he is to attend to in certain respects, and so cannot attend quickly or well; as soon,

however, as this cause of uncertainty is removed, he can. There is no question here as between types of attention; it is rather a question of good attention and bad attention. And the result is what the type-theory says it is: with the attention bad, the reaction was long; with attention good, it was short. The case is too meagre to be of any value except as a tendency case—were it not that Professor Titchener uses it again below, forgetting all the proper demands made earlier in his paper for exact figures. As to the Donders case—it is pure surmise one way and the other; I cited it in my other paper only as showing the length that the Leipsic people are willing to go with their distinctions.

As to additional cases from which the author says I do not claim support, it is equally true that I make no reference to them, again not writing a 'catalogue': the main reason that I did not 'claim' certain other cases recorded in the literature of the topic, was that I thought the cases cited were sufficient.

So much then for the 'evidence for the type-theory.' I submit that it is strengthened by Mr Titchener's examination of it. And there is, besides, the great mass of evidence drawn from the pathology of the motor functions, and from the general principles of habit and relative accommodation of the attention, which are stated at some length in my article. All this field is untouched by the examination of our author, although it is there that—apart from the actual cases reported—I lay 'greatest reliance.'

But Mr Titchener is not yet done; he next cites 'evidence against the type-theory.' And what he cites he himself describes as 'these two negative instances'—i.e. of himself, and of Binet's case of M. Inaudi. As to Professor Titchener's case, as he reports it from his impressions of his own mental life, he simply shows, with quotations from my book on *Mental Development* also in support of it, that type differs in the same individual for different functions, and 'shifts' with education for the same function. Both of these points I admit; and I have put both of them in evidence in the book quoted: but how do they bear against the type-theory of reaction? They do not. The reason it is a *type*-theory is just that it allows for such variations; and it matters not whether the variation, in any case, be in a person or in a function. And indeed, the very ground of origin of types is to be found in education, which must necessarily apply to single functions. But I do not think that the little practice that one may give himself in a year or two, or in the case of one function or two, is likely to alter the general type of his reactions; that goes in most cases deeper down in the habits of one's life. This is all that Professor Titchener's case shows, and even then are we not taking very general statements for figures? Why has not Professor Titchener tested himself for type by some of his 'many methods'? He seems to forget those 'many methods' when he now says: 'the elucidation of a memory type is by no means an easy matter.'

The other case, that of M. Inaudi, is to my mind unavailable.

Inaudi is a prodigy of mathematics, investigated by Binet and found to be dependent upon hearing in his calculations. Professor Titchener draws the inference, and it seems that Binet did also, that he should give a remarkably short auditory reaction compared with his other sensorial times. This he did not, when investigated; and so he is now cited as evidence against my theory. Of course I reply as Mr Titchener supposed I should, that this does not show anything about his muscular reaction. And further it is quite too abnormal a case to show anything about the relation of the different kinds of sensory reactions to each other. This arithmetical work on the part of such prodigies is not to be accounted for as due to habit, practice, training of the attention, &c., the usual ground of type distinctions; it is rather a variation of an obscure kind, some sort of a twist of which we know really nothing, and in it Professor Titchener ought to recognise an *Anlage* if there ever was one, and promptly rule it out of the laboratory. I quite agree with M. Binet in saying in the passage which Mr Titchener quotes: "It must not be supposed that M. Inaudi is an auditive outside of his professional exercises in calculation. He is an auditive for calculation, *i.e.*, for one partial, special, sharply defined memory." It seems to me quite likely—if this freaky calculating gift be amenable to any rules—that for this function his muscular reaction would be longer than the sensory. But for his other senses it seems to me also probable that he was reacting all the time in a muscular way. And even though M. Inaudi gave all his reactions with muscular attention as Professor Titchener supposes, how does that in any way 'tell heavily against the type-theory'? That theory does not say that no one shall react in that way if he want to. In that case one would only have to suppose that Inaudi's reactions of the two kinds to sound were about equal and both very short. This is supported by the lack of conclusive evidence that he was much more auditive than motor, even in his calculating.

After all this rather tiring discussion, in which there is on both sides too much hair-splitting, hypothetical interpretation of cases, and conjecture as to what a reagent 'ought' to do on this view or on that, I find relief in turning to one or two of the larger bearings of the subject. They may be taken to be a further statement of aspects of the general position now sufficiently well characterized by the phrase 'type-theory.' At the same time, I desire to thank Professor Titchener for the careful consideration he has given to my point of view.

1. It is not a necessary corollary from the type-theory that a subject be of the same type in his reactions with the hand to sounds, sights, &c. that he is in his speech. I think, as I said in my earlier article, that this is oftener so than not; and it was this thought that first led me to look to the general doctrine of types for an explanation of the variations in different persons' times. We find that speech itself may vary in its type very remarkably in the same individual from one language to another, especially when the

conditions of learning have been fairly consistent and of long duration. The case described by Ballet, and my own sense of relative contrast in type as between my use of French and German¹, are instances of this. And the pathological instances of damage to the brain which incapacitates the patient from using one language while another may remain intact—together with many interesting minor variations—tend to furnish evidence in the same direction. It should not surprise us, therefore, if it should finally become evident, in any subject, that a hand-function, such, say, as hand-writing, was most readily stimulated by some other centre in the brain than that which serves for the 'cue' to speech; giving in the same person one type for writing and another for speech. I am concerned to say this here since in the same article Professor Titchener holds me somewhat strictly to the complete parallelism between speech, on the one hand, and hand-functions on the other, interpreting my statements that way—with some right to, certainly, from the partial statements of my earlier papers.

2. An important requirement, which Professor Titchener has not brought up against the type-theory, is yet to be fulfilled; and I hope to go into the consideration of it and the point mentioned immediately above when I publish the further experimental results which are accumulating in my laboratory. The requirement is this: should not any theory of the variations in the relative lengths of the two sorts of reaction in different individuals give some kind of an account of the great disproportion between the number of cases which give a shorter muscular, as against those which give a shorter sensorial, reaction-time? Professor Titchener may find it difficult to formulate such a requirement, since it would seem to commit him to the recognition of some instances of the latter. But those of us who believe in testing everybody, and in making the differences themselves fruitful data for theory, are bound to recognize the disproportion spoken of, although, for myself, I think when more laboratory workers take persons just as they come, the relative numbers will probably be more evenly adjusted.

Yet, as far as this disproportion does exist, as it appears to, I think it really bears out the analogy of reactions generally with speech. The discussions recently published on so-called 'internal speech' turn, it will be remembered, not on the question as to whether there are the same number of cases of persons sensory as motor in their speech; but rather on the question whether all men are not motor. As I have put the question elsewhere, for convenience in grouping the evidence *pro* and *con*, 'are the kinesthetic memory centres intrinsic to speech,' or not?² There is a school of physiologists and psychologists, represented by Stricker of Vienna, who go so far as to deny that any persons can speak without the

¹ See my *Mental Development: Methods and Processes*, pp. 435, 461 note. Ballet's case is to be found in his *Le langage intérieur*, p. 62.

² *Philos. Review*, July 1893, p. 386, incorporated in *Mental Development*, Chap. xiv.

incipient stimulation of the motor organs involved. They seem to me to be for that discussion about in the position that the Leipsic people are for the discussion of reaction. And while the case for speech seems to be going clearly against them on pathological grounds, yet they have by far the larger number of cases. The literature seems to show a great disproportion of cases in favour of the motor aphasia: and that fact has seemed to keep back the recognition of the sensory cases. Those who are familiar with the literature of aphasia will, I think, agree that the type-theory has had this obstacle to contend with. So, while I may not stop here to make good the indications now noted of the state of the facts in regard to aphasia, perhaps sufficient has been said to show that, far from being a difficulty to the type-theory of reaction that the disproportion of cases is as it is, it rather seems to extend and strengthen the analogy with the mechanism of speech.

P.S. Since writing and despatching the article above, I have received a letter from Professor James R. Angell of the University of Chicago which promises further experimental confirmation of the type-theory. He says, under date of Nov. 9, 1895: "It may interest you, in connection with Titchener's criticism of your theory for reaction time peculiarities, to know that at the very time your article appeared, I had all ready a considerable body of experiments remarkably similar to yours from which I had drawn conclusions absurdly like your own. I decided to postpone publishing until I could supplement them with more detailed work. I hope to get the thing into print before long. It seems to substantiate entirely the general *principle* underlying your view, although introducing some minor modifications."

J. MARK BALDWIN.

CAUSATION.—ITS ALLEGED UNIVERSALITY.

(1) I endeavoured to indicate in a recent paper what, as it seemed to me, were some of the transformations of meaning which the all-important word "cause" undergoes, in the course of the development of language. With regard to any such word, it is safe to take it for granted that the primary meaning is something objective and palpable. Simple acts, such as the moving of a book, or the filling of a glass, stand for us as the types of causation. The meaning of the word must therefore have travelled far before it can have come to be applied to such shadowy entities as Gravity or Affinity, which are, in the last analysis, mere expressions for the fact that the occurrence which they are said to cause will take place.

(2) How the transition comes about is traceable as follows. The type meaning is the act of a living being, not necessarily the

conscious or intentional act. I might move a thing by accident and would still be thought of as causing its change of place quite as certainly as if I moved it with intention. The meaning here is confined to this:—that there happens the action of one thing on another, and action which, for a moment, forms to sense part of the same phenomenon with the result. As, however, most of the acts either of ourselves or others, of which we are cognizant, are conscious and intentional acts, intention soon comes to enter into the signification of the word. We think of everything that is made or done as being made or done intentionally. In intentional acts, again, there is always this feature, that they are copies of some previous act. In the intentional act, we copy an idea, and the idea again has been copied from some previous act. All intentional acts have thus the element of repetition about them. They are actions done by rule. We can obviously frame no rule ordering us to vary our action each moment, and instructing us how to vary it. The very nature of a rule is that it orders us to repeat in the future, and in other circumstances, something that has already taken place in the past. The rule for making a straight line is to continue the motion begun in the same direction, to go on repeating, as regards direction, the part first made. The kaleidoscope, by repeating any irregular figure, makes a regular one, that is, one seemingly or really constructed by rule. Our attention being now fixed on this aspect of the conception, we drop intention itself out of sight, and think of a cause as that which, whatever it is, tends to bring about action by apparent rule, action which is the repetition of uniformities. In this meaning cause approaches the signification of natural law. The original meaning of cause, however, in which there is no implication either of intention or of uniformity, still continues to be used concurrently, and it may be interchangeably, with the new meaning; and this circumstance is evidently capable of becoming a fertile source of fallacy and confusion.

(3) The doctrine of the universality of causation is often, if not ordinarily, looked upon as standing on ground which is quite impregnable. I question, however, whether, as applicable to anything but abstractions, it really stands on any ground which is more satisfactory than this, that when a thing is not caused in one sense, it is, for the most part at any rate, caused in another. Every affirmation of any characteristic as universal is *ipso facto* suspect. It is a familiar truth that as the extent of a concept widens its content diminishes, and the conclusion seems to be unavoidable that when the extent becomes universal the content must be zero. If it is the case that even legitimate extensions of the denotation thus weaken the connotation, much more is it the case that illegitimate extensions do. To take an example from the history of philosophy: Hume places the mathematical axioms in one class, the law of cause and effect in another. His followers think they will go a step further. They concur with Hume in regarding the law of cause and effect—whatever they mean by that expression—as a truth of experience

only, but add that the axioms of mathematics are nothing more than this either. The result is, of course, to defeat their own object. If their view were accepted, it would follow that the law of cause and effect would be regarded as, at any rate, as axiomatic as the axioms, and no one could have ever contended for more than that. Similarly, if anyone propounds or accepts the opinion that all the owners of landed property are "robbers," or that all the persons in the enjoyment of independent incomes are "social parasites," "robber" and "parasite," silently and unconsciously perhaps, but none the less certainly, drop for him all their vituperatory connotation, and become "robber" and "parasite" in the Pickwickian sense only; something that innumerable good citizens are, and that all without exception desire to become. Language not based on nature depreciates in meaning as certainly as a currency not based on nature depreciates in value. Let us say that everything is unreal, that everything is illusory, and the assertion amounts to nothing for us; unless indeed it be to drag a red herring across the scent, and to prevent us from endeavouring to discriminate those elements in sense and thought which are in truth illusory or symbolic from those which are not so. If causation were, as Mill affirms it to be, true of all successive phenomena, it is hard to see how it could be anything but a synonym for succession. So, if anyone asserts that it is universal, and that such a thing as chance does not exist at all, he should make it his business, first, to show how any characteristic can be universal without becoming nugatory; and, secondly, to show how, if chance does not exist at all, it happens that we have a word for it to which we attach a very distinct and definite meaning; and how it happens that writers who deny its existence on one page have to discuss its nature and its mode of operation on the next.

(4) Suppose I throw the dice and they turn up fours, what is the cause of this conjunction taking place rather than of any other? We have made the dice regular in shape and homogeneous in substance, so as to eliminate any constant cause, that is, any cause acting by apparent rule, which would determine the fall in favour of one combination of numbers rather than of another. The cause then lies in the nature of our act, but is there, in that, any cause working by rule either actually or conceivably? The causes which determined the fall of fours this time instead of threes, as last time, were, no doubt, to be found in the difference between my actions in putting the dice into the box, in holding it, and in throwing them on the table, on this occasion, and on the former one. These differences, however, were something that then appeared for the first time in the world, and, being entirely unrecallable by memory, can never to our knowledge appear again. No rule or appearance of a rule even can possibly be applicable to them. The completest possible resemblance to the past can only assist us to guess the future, in as far as the future resembles the past. In as far as anything varies from everything in the past, it is an event towards the prediction of which even perfect experience could render us

no assistance whatever. We have a method therefore of deciding whether any conjunction of events is subject to causation, in the sense in which causation is synonymous with law, by asking:—is it a conjunction towards the prediction of which any conceivable experience could assist us? In this case it plainly is not. The nature of the throw depends on acts which, in their salient particulars, resemble nothing in the past, and cannot anyhow be made to resemble anything, or even to approximate, in the smallest degree, towards anything in resemblance, any more closely than they do already. The fact that we can guess how many times in a hundred any special throw will occur, though a fact that is interesting in itself, is not one that in the least assists us to guess what throw will occur next time. In Meteorology, science takes it for granted that the difficulty of prediction springs out of the imperfection of our knowledge, an imperfection which it always hopes to remedy; in the doctrine of chances on the contrary, it takes it for granted that it springs out of the nature of things. If, however, the result of the throw is not determined by any cause whatever in the sense in which cause is equivalent to law, how is it, it will be asked, that we so unhesitatingly ascribe it to a cause, viz. to the particular force and direction of our throw? It is simply because, in doing so, we revert to the primary meaning of cause, the meaning which contains no thought of rule or uniformity, but comprises merely the notion of external action that dovetails into the result. If sixes turned up steadily more than once in thirty-six times, over a large number of throws, we should say there was certainly some cause for the dice falling as they did, the implication being that when nothing like this happens no cause, in our opinion, has made itself felt. If then, next moment, we assign a cause, what can be more obvious than that it is in a different sense that we assign it?

(5) To take another instance; we subject two sets of chemical elements to the same conditions; the result is, in each case, identical. When oxygen and hydrogen combine, we can be quite sure that the result will be not something very like water, which, however, varies slightly from it, in some of its properties, but that it will be water with a perfect resemblance, in all respects, to the water that we have known in the past. In the inorganic world, as far, at any rate, as the qualities of things are concerned, causation, in the sense of action guided by unvarying rule, is universal. The experience of the past, when only sufficiently complete and unerring, is a perfectly adequate guide to the prediction of the future. When Life enters on the scene, all is altered. If we put two seeds, off the same plant, into the ground and subject them, in as far as we can, to identical conditions, the result will only be closely similar but never identical, and may now and then present a very pronounced variation. The proportion between the degree of the variations and the approximation to identity in the conditions, is not such as to lead us to believe that if we could make the conditions absolutely identical the result would be identical. The contrary conclusion indeed may be taken

as established, that even if the conditions were made identical, variations would still ensue. In as far as such variations, small or great, really vary from everything in the past, it is obvious and manifest that even omniscient experience, so long as it was experience only, could give us not the smallest assistance in guessing at their probable nature. Causation, in the sense of action by rule, ceases altogether to be applicable to them. They are, on the contrary, the source of all that is new in the world. In this case, moreover, there is no such thing as external action. Antecedent causation, therefore, cannot in any sense rightly be predicated of them. They are, so far as human knowledge goes, the acts of the organism itself, and are reducible to no rule, predictable by no experience.

(6) If there is no inherent absurdity in supposing that, at the present stage of the world's development, the history of the past would furnish data for the prediction of the remote future, then it is hard to see why there should be any absurdity in supposing that it would furnish similar data at any previous stage we choose to fix upon. Yet who would maintain that the experience of the mollusc could furnish data for predicting the instincts of the dog, or that the experience of prehistoric savages could furnish data for predicting the Herbartian psychology? The life of the future, however, may diverge, not less but infinitely more widely from anything in the present than the life of the present has diverged from that of the past. If the whole future, however, is not calculable, then even the immediate future is not calculable with precision, and the whole theory falls to the ground.

(7) The truth is, the theory very plainly confuses supernatural knowledge of the future with knowledge based on experience. Mr Mill says (*Logic*, II. p. 406) "given the motives which are present to an individual's mind, and given likewise the character and disposition of the individual, the manner in which he will act may be unerringly inferred." The fallacy lies in the words "given the character." If by the character being "given" is meant that we are supposed to know, as God alone can, how a man will act in any given circumstances, then there is nothing left to infer, and the dictum is meaningless. If by its being "given" is meant only that we have as much knowledge of it as experience of the past can give us, then there is no such thing as unerring inference with regard to it. A man who thinks that he knows his own character thoroughly is often amazed at the manner in which he finds that he acts, in unexpected circumstances. Natural law is often taken, even by accurate writers, as if it meant something that excluded variation. A truer view is that it is, like the Civil Law, "a limit of variation." As regards the phenomena of life, however, it is not a definite limit. We can say of such natural kinds as silver, or mercury, that, at certain precise temperatures, and under certain precise pressures, they are solid, or liquid, or vapour. Of such a natural kind as Man all that we can say with precision is, perhaps, that he will not be born with his head between his shoulders, or that, if his parents are pure blooded whites,

he will not be black. At any rate, the precise statement can only be made precise by being made negative. No precise positive statement in regard to him is valid. "The fewest and simplest assumptions which being granted the whole existing order of nature would result" (Mill's *Logic*, I. p. 327) are, in addition to the laws of matter and motion, the specific nature of every past and of every present living thing.

(8) If this view of the scope of natural law diverges somewhat widely from current formulas, it must be remembered that current formulas fail to square with the possibility of anything new ever occurring in the world, and would reduce all living action to the category of mechanism, a category to which it evidently does not belong. The natural man has a healthy conviction that his action in the world is capable of having not only an apparent but a real effect in promoting or in hindering the welfare of himself, his country, or his race. He knows that what he does now will give rise to an endless series of good or evil effects in the future. It is this conviction that, in Carlyle's view, has taken shape, in the world, in the doctrine of eternal rewards and eternal punishments. The natural man will do well not to discard it as an illusion, at the instance of any metaphysical theory, without making quite sure first, that the theory is not really built on the fallacious use of one word in two senses.

(9) The world owes to the speculations of Herbart and Lotze the clear recognition of the fact that the cause in itself, and apart altogether from the effect, is never to be viewed as one thing, but always as the interaction of two. Thus while "cause" covers a wider sphere of signification than "law" in one direction, as comprising, in all instances, external action whether characterized by uniformity or not; "law" covers a wider sphere than "cause" in another direction; as being applicable to uniformities which are the result of immanent action, as well as to uniformities which are the result of external action. Mr Mill exhorts us to discard the ideas connected with the words "Agent" and "Patient" as being popular and unscientific. If, instead of discarding them, he had enquired into their significance, this truth at any rate might have been brought home to him. Hume continually speaks of the causal connection between two "objects," and Reid and Mill both discuss such a question as why we do not call night the cause of day. We cannot call night, in such a case, a cause at all, because there is no complex element in it; there is no thought of Agent and Patient, and of the interaction between the two. Mill's own account of the reason why we do not call it so, is found really to be based on this reason. We do not call it the cause of day, he thinks, because, though it is the invariable antecedent, it is not the invariable conditional antecedent. Both night and day are viewed as being together dependent on other causes. It is just as in the case of the train¹, we do not think of the front carriages as being the cause of the motion of the carriages

¹ Instanced in my paper in a previous number.

behind, but of the motion of both as being due to a common cause, the Engine. In the relation of the engine to the train there is the thought of agent and patient and of their interaction. In the mere antecedence of one carriage to another there is no thought of the sort.

(10) Two classes of cases of interaction between agent and patient have to be broadly distinguished. In the one there is simply action *a tergo* of the agent on the patient, and there the phenomenon ends. In these the causation is self-evident; it is fully understood. As Mr Mill puts it, in referring to the connection between the sun's presence above the horizon and daylight, it is necessary. Such a case would be our type instance of the moving of a book. In another class of cases, the action of the agent on the patient is followed by a subsequent reaction springing out of the nature of the patient itself; and such cases as this form the type of truths of experience¹. If I move a stone from a position where it is supported to one where it is unsupported, and let it go, the phenomenon does not end with my action; the stone further falls earthwards. It is to be observed, however, that every case of causation proper of the latter sort comprises a case of the former sort, as part of it. If we stop at the fact of the letting go of the stone, and exclude the thought of what follows, we have a case of the former sort. The distinction between them, in such a case, is an abstract distinction only. The one, we may view as the cause of the *event*, the other, as the cause of the *uniformity*. The two are related, in nature, as the Major and Minor premisses of the syllogism are, in reasoning. The Gravity of the stone is the Major premiss, and corresponds to the antecedent knowledge "All stones fall earthwards, if left unsupported in space." My act in letting it go corresponds to the Minor "This stone is unsupported in space"; from which the conclusion that it will fall earthwards unfailingly follows. The syllogism is, in truth, what it claims to be, the universal formula of reasoning, and not a meaningless *petitio principii*. A conclusion that belongs to the future cannot be begged by us in the present. The Minor is not to be regarded as the recitation of something for the knowledge of which we draw on Memory or authority; but as the recognition of an event that occurs, in the continual flux of things, at the very moment of its occurrence. It is to be observed, too, that it thus appears that the Minor, in cases of natural inference, must always be a singular proposition, never a universal. We cannot observe universals at a glance. The only cases in which it can be a universal are cases in which intercourse comes into play; and in which it is, perhaps, the admission of an opponent, or, at any rate, is derived, in some way, from authority, while the process of reasoning is still in progress.

¹ Science, of course, teaches us subsequently that there is always reaction on the part of the patient. For the present purpose, however, it is only what is obvious to sense that is to be taken into account.

VII.—CRITICAL NOTICES.

Mental development in the Child and the Race; methods and processes. By JAMES MARK BALDWIN, M.A., Ph.D., Stuart Professor of Psychology in Princeton University, &c. New York and London: Macmillan & Co., 1895. Pp. xi, 496.

THIS is a book which presents special difficulties to the reviewer. One looks on a biological work—for such Professor Baldwin's work seems to be quite as much as a psychological one—for arrangement, structure, organic form: in the present case one is struck almost at the first glance by the apparent absence of these attributes. And the first impression is by no means dispelled as one begins to read. One seems every now and then to be jerked off to a new topic by no means obviously connected with the subject dealt with. There is a quite perplexing amount of anticipatory allusion to later chapters, which is a pretty sure sign that there is something amiss with the order of treatment. Subjects are returned to and re-discussed with some fulness, even new definitions of terms, *e.g.* those of habit being introduced after old ones have been laid down. The reader has a sense of coming round again and again to the same topic not unlike what one experiences when following the movement of a rondo. A further difficulty in the way of seizing Prof. Baldwin's thought is his fondness—a passion one might almost call it—for new phrases. He shares with Prof. James a strong bent to metaphor. In some cases he undoubtedly introduces by these verbal inventions not only an element of freshness but an added clearness of expression; but in many others he seems rather to darken than to illumine, as when for example he employs the name 'Plastic Imitation,' so directly suggestive of art imitation, to designate the subconscious imitation of others' doings and opinions (p. 352).

To these difficulties in the way of the reviewer one must add others having more of a moral character. Prof. Baldwin is a young American, and this means that he has a good deal of go-aheadness, of impatience for ideas more than a year old. This characteristic in itself is attractive and exhilarating, especially for the slower-moving European worker. But unfortunately the eagerness to strike out a new path takes on in the present case a form which according to my experience is, to say the least, unusual in a scientific

treatise. The author has a way of insisting on the originality of this and that idea in a way that is apt to be provoking to average human nature. And then he quotes or at least refers to his own previous writings to a quite unusual extent, and even goes so far as to quote Prof. W. James's favourable opinion of one of his ideas. This, though possibly destined to be the manner of the *Zukunftswissenschaft*, is a little trying to an old-fashioned reviewer. Even this, however, is not the worst. What is positively irritating is the appearance of a disposition to belittle the work of others, all at least except Americans who as we all cheerfully allow are just now in the foremost column of the advancing scientific army. Prof. Baldwin, to judge from his criticism of what he is pleased to call the Spencer-Bain view of the genesis of volition, has not made a very serious study of the writings of Dr Bain or of Mr Herbert Spencer. Unless I have strangely misunderstood the views of these writers they cannot be 'bunched,' to use one of the writer's graphic expressions, in the way he supposes. And each of the views, thus criticized as one theory, appears to be much nearer in certain respects to Prof. Baldwin's own doctrine than he imagines. This appearance of a hasty dismissal of others' claims is still more conspicuous elsewhere. On p. 451, for example, when touching on the theory that volition is (voluntary) attention to an idea, he refers as usual to an earlier writing of his own and also to the work of Prof. W. James, but makes no reference to the now classical article on 'Psychology' by Dr James Ward. Similarly in developing a theory of the *modus operandi* of attention strikingly similar in its essentials to Professor Wundt's well-known view, he makes no direct reference to the latter, but contents himself in a footnote with bidding the reader note a reference by Höffding to the similar doctrine of Wundt (p. 463). This and much more argues either that Prof. Baldwin is knowingly unfair, which of course I do not believe, or that he is very little in touch with doctrines which are still regarded by Europeans at least as a part of the common knowledge of psychologists.

I have felt bound to enlarge on these obstacles which the author has put in the way of a clear understanding and a fair estimate of his book; for it is quite possible that I have not surmounted them, and that the opinion of the work which I have done my best to form may turn out to involve a certain amount of misapprehension.

After defining what he considers the relation of Infant to Race Psychology Prof. Baldwin gives us what is to me the most interesting if not the most valuable part of his work, a series of chapters on child-study. He develops a 'new method' under the head of the 'Dynamogenic Method' which consists in observing the motor reactions induced by sense-stimulation. This is applied ingeniously to an enquiry into the distance and colour perceptions of children. Prof. Baldwin carried out a series of experiments on the colour-sense by presenting successively in suitable situations

certain colours (yellow was not included) and noting the relative numbers of the grasping reactions called forth. The results are expressed as follows: "the colours range themselves in an order of attractiveness, i.e. blue, white, red, green and brown." The writer at once goes on to say that this confirms Binet as against Preyer (who puts blue last). But oddly enough he does not remark that whereas, as he sees, his experiments have to do with colour-preference, Preyer's have to do with *Farben-unterscheidung*. That a child will snatch at one colour more frequently than at another does not in itself show that he discriminates the former better than the latter. It may indeed be contended that to select a colour at all involves discrimination not only of that which is preferred but of that which is rejected. A better test of discrimination might be the placing successively a number of small coloured objects on a background of another colour of an approximately equal degree of luminosity, and calling forth manual reactions by making the coloured objects to be grasped, moveable and otherwise, as attractive as possible as a plaything. The child might previously be familiarized with the nature of the playthings when not coloured. If some such line of experiment could be followed out before the accidents of ordinary surroundings, as the mother's dress and what not, had already given an advantage to certain colour-impressions—a very difficult condition to realize—it might be possible to employ Prof. Baldwin's interesting method of investigation with good effect. But the difficulties of the problem which the author hardly seems to realize are very great and as yet quite unsurmounted.

With reference to the general value of Prof. Baldwin's observations of children it may be said that he now and again shows a real aptitude for seizing and interpreting familiar events of child-life. On the other hand the range of his observations seems by no means wide, nor does he give clear evidence of having assimilated the now considerable mass of material gathered by others. In certain cases, as when (on p. 333) he tells us that his child in her fifth month cried out when he pinched a bottle-cork, and in her 22nd week wept at the sight of a picture of a man sitting weeping, giving both observations as examples of sympathy, one feels it would have been well if the author had more fully described in each case what took place. As to knowledge of earlier work it is enough to refer to the astonishing statement on p. 317 that no 'exact observations' before his own had to his knowledge been made on the first recognition of pictures. Miss Shinn, to whose valuable memoir Prof. Baldwin elsewhere refers, has a whole series of fine observations on this point.

We may now pass to what the author would probably consider the really important constructive part of the book, the doctrine of 'suggestion' including as it would seem as its highest phase Imitation. Suggestion is defined (p. 105) as "the tendency of a sensory or an ideal state to be followed by a motor state." Prof. Baldwin does not tell us whether under *ideal state* he includes ideas of

movements themselves, but his illustrations appear to show that he does, and this is borne out by the fact that he accepts the new view that motor presentations and ideas are essentially sensory phenomena. The truth brought out by this new name is, then, the now familiar one that sensory stimulation, as well as the ideational stimulation which succeeds and represents it, always tends to be followed by movement. Whether it was worth while to apply the name *suggestion* here may well be doubted. That word is already employed in two distinct senses in psychology, (a) for the reactions called forth in the hypnotized subject by a verbal or other mode of induction of certain ideas (obsessions) by a second person, and (b) (though less uniformly) for the reinstating part of the process of reproduction. For Prof. Baldwin's 'suggestion' we have moreover as he seems to allow the familiar names 'sensori-motor' and 'ideo-motor' action; and to both the term *reflex mental process* seems more suitable than *suggestion*.

We now come to the author's theory of development as determined by successive adaptations. All organic reactions or movements are in his view reflex or 'suggested' responses to sensory stimulation. He rejects the notion of random or 'automatic' movements as entertained by Bain, Preyer and others. Organisms have, owing to the play of natural selection, become so constructed as to respond to beneficial stimulations, as those of food and oxygen, by expansive or advancing movements, and to hurtful stimulations by contracting or retiring movements. The author simply assumes this fact, contenting himself with a reference to the observation that certain low organisms have been observed to 'go for' light or for nutritive material, and to shrink from injurious matter. He does not attempt to establish it as a generally useful arrangement in the case of animals with differentiated sensory and motor organs. How, one may ask, can it be shown that the tendency of a stimulation of an animal by the heat and light rays of the sun to call out advancing movement would in general be beneficial to the animal? The animal cannot, it is evident, get nearer the sun by such movement, and if he could his impulse would end in the fate of the moth circling about the lamp. The best policy of such an animal, as indeed of higher creatures, might well seem to be to remain as he is for fear of losing his sunshine. Such objections may seem trivial to Prof. Baldwin, but they may suffice to show that he hardly carries out his biological speculations with that firm grip on all the pertinent facts which characterizes a Darwin.

With this biological hypothesis as a foundation Prof. Baldwin proceeds to build up the later processes of development. Movements called forth by pleasure-bringing stimulation tend to bring about a prolongation and intensification of the pleasurable sensation, and thus we get a 'circular process' of which the author makes much later on. He seems to allow that the pleasure has for its concomitant a general heightening of the current of nervous energy, and so of

movement; and, as I understand him, the useful pleasure-continuing reactions, so far as they have to be differentiated out of the primal organic tendency to react expansively or contractively, are gradually selected out of a mass of useless ones which together constitute what the writer rather happily calls the 'excess discharge.' This is the true process of accommodation after consciousness appears on the scene. In enforcing it the author vigorously attacks Bain's idea of a selection of 'accidental' movements, the difference between him and Bain, so far as I can seize it, being that there is already at work the organic (unconscious) tendency to react with the appropriate difference of advancing and retiring movement according as the stimulation is beneficial to the organism or the opposite.

We may now pass to the author's account of Imitation which, as the highest phase of the reflex or suggestive process, underlies the whole of the true processes of volition. Prof. Baldwin describes an imitative action as "a sensori-motor reaction which finds its differentialia in the single fact that it imitates." To imitate, he explains, is to reproduce that which excites the movement. Thus the reaction which issues in a prolongation of a light-stimulus is according to him a kind of imitation. All organic adaptation is thus, as he expressly tells us, a "biological or organic imitation." In conscious action we have 'conscious imitation.' Thus in the act of stretching out cold hands towards the fire I am imitating the 'copy' already in my mind as an idea: that is, apparently, I am realizing in actual sensational form the idea of warm hands. What is ordinarily called imitation is but a case of the same 'circular process' or reproduction (actualization?) of 'mental copy': for in imitating another's movement a child is merely reproducing the idea of that movement, that is, I take it, the visual representation with or without that of the arm-experience itself. Prof. Baldwin in a footnote tries to meet the rather obvious objection to so new and confusing a use of the word 'imitation': but what he says fails to convince me of the need of such violence to current distinctions. Volition in the proper sense arises out of persistent or repeated imitation, that is, a repeated effort to imitate what is seen or heard. A whole chapter illustrated with some curious diagrams is devoted to this process. The author evidently sees where the real psychological difficulty of explaining a new adaptive movement lies, and his theory that a repetition of imitative movements (as commonly understood) leads by gradual approximations to the fitting new action is skilfully argued. Ingenious as it is, however, it will hardly bear the strain he seeks to put on it. In order to support it he has in my opinion to transform the child-life which we can observe about us. To suppose that the rudiment of end-seeking action lies in imitation and in imitation only seems to me to be contradicted by only a slight acquaintance with the nursery. Where is the imitation (as commonly understood) in the child's first endeavour to improve the manner of taking his food, in his attempts to get at a rattle which has slipped away from him, and many another effort of his first

year? In truth the writer seems himself to see that imitation is not the only, if indeed the chief source of volition, when he writes of his child "dragging a table-cloth, in her seventh month, to bring my bunch of keys within reach." "She remembers (he continues) the movements necessary and makes them voluntarily for an end—movements *she had before found out by accident*, or had seen someone else make" (pp. 427, 428; the italics are added by me).

I have postponed reference to another part of Prof. Baldwin's theory because it is in a manner independent of his main doctrine of volition, viz. his account of the processes of Attention and Recognition. He here follows Münsterberg in making the motor reaction the characteristic and determining factor. Accepting the doctrine that attention is motor adjustment having certain reflex or 'circular' effects on the exciting sensations or ideas, he argues with some force that we ought not to speak of any single faculty of attention. Attention, that is specialized motor reactions, appear, now as visual, now as auditory, and the several adjustive reactions vary greatly in their relative degree of perfection in different individuals. This is important, even though, as the author seems to perceive, the higher kinds of attention as exercised in thinking are largely the same process. He employs the motor theory of attention very ingeniously to explain simple assimilation or recognition as distinguished from associative recognition as illustrated in Lehmann's experiments. According to Prof. Baldwin we recognize a thing when the motor process of adjustment in attention has been perfected by practice and so grown easy. The theory—which has a superficial resemblance to Dr Ward's explanation of recognition—is a plausible one, but it will not, I think, bear detailed examination. It seems to do for tones, to the varying pitch of which distinct ear-accommodations probably answer. But I fail to see how a new taste, or a new tint, requires a process of motor adjustment different from that of an old one. Subjective observation bears this out. If only a colour is properly placed the motor adjustments necessary for seeing it distinctly are indistinguishable whether the colour be a familiar or unfamiliar one. The special muscular strain we experience in looking at a new colour arises from the circumstance that as new and unrecognized we need to get a more perfect and more prolonged impression of it. In other words the strain is the *effect* of the non-recognition and cannot therefore be its cause. One asks, too, how it comes about on this theory that we can ever recognize a thing that looks strange at first, but is recognized after a closer inspection involving considerable strain of attention. Here, surely, the ground of recognition is not in the *ease* of the motor reaction.

To sum up my impression of Prof. Baldwin's book. It seems to me in many respects fresh and stimulating. On the other hand in what looks like an over-straining after originality apparent newness of conception often turns out on closer examination to be but newness of phrasing. When new ideas are put forward one misses for the most part an impartial and thorough-going confronting of theory

with fact. The author is evidently satisfied with the truth of his new theory: he has however a good deal yet to do in order to make it convincing to others.

JAMES SULLY.

Die Urtheilsfunction. Eine psychologische und erkenntniskritische Untersuchung. Von WILHELM JERUSALEM. Wien und Leipzig: W. Braumüller, 1895. Pp. 269.

THE author starts with a consideration of the meaning and importance, from the psychological, logical, grammatical and philosophical points of view, of the question, What is Judgment?

With regard to the grammatical reference, that bears chiefly on the relation between thought and language—from the logical point of view as expressly explained by Mr Jerusalem, living flexible judgments have to be reduced to a rigid connexion of concepts. The author's view of the philosophical place of the doctrine of judgment is discussed at the beginning and end of the book, and its importance strongly emphasized.

But the bulk of the work is devoted to what the writer regards as the psychological view of judgment—his expressed intention is to furnish "a thorough psychological analysis of the cognitive function."

In part of this investigation—the part which is distinguished as *analytic* rather than *genetic* or *biological*¹, the exceedingly close connexion between Logic and Psychology, and the difficulty of everywhere drawing a sharp line between them comes out very strikingly; for we are given what purports to be an *absolutely general* account of Judgment—an account, *i.e.*, which will and does apply to every judgment without exception, when rigidly analysed. This analysis is of course psychological, and it appears to me that it is judgments as thus understood that are the subject and centre of Logic. If there is an absolutely general account of judgments, on that, it would seem, Logic must rest, and with that it must begin. Although the author, to judge from some of his statements, is not in harmony with this view, it is apparently involved in his opinion that on a complete and satisfactory answer to the (psychological) question What do we do when we judge? depends our whole theoretical view of the world, and that whatever is essential to judgment must hold of every content of judgment. Part of this view seems to me true and important—and it is involved in Mill's account of the Import of Propositions, according to which, for a due analysis, there are two questions which have to be answered (1) What do the Terms stand for? (2) What is the relation

¹ Meaning by *biological* the point of view from which the psychology of judgment has to investigate the significance of the form of judgment in regard to the preservation of the individual and the race.

between the Terms? If we *so far* know what the Terms stand for as to know what the relation between them is, we must also know (as in this book is pointed out) what is the essential constitution of the object of knowledge.

Mr Jerusalem holds that in every (categorical) Judgment some content present to the mind is moulded, systematized and articulated, and thus reduced from indetermination and chaos to system and intelligibility. This is accomplished by help of the idea of Force and Manifestation—the Subject standing for a Centre of Force and the Predicate expressing some manifestation of that force. He undertakes a brief historico-critical review of the doctrines of other logicians concerning judgments, supports his own by a detailed analytic and genetic discussion, and tests it by a critical and comparative application to different kinds of judgment or proposition; finally, after discussing the general trustworthiness of judgment, he takes up the philosophical aspect of the question.

Passing over the interesting references to Greek and Scholastic doctrines, and a brief account of the modern theories of judgment, it may be noted that current theories are grouped under four heads: (1) *Judgment is a belief*—here Mill and other English thinkers, and Brentano's 'Idio-genetic' doctrine are criticised. (2) *Judgment is a synthesis*. Under this head Sigwart comes. (3) *Judgment is an analysis*. Wundt and Erdmann are mentioned as exponents of this view. (4) *In Judgment a presented or ideated content receives form and objectification*. This of course, as far as it goes, is the author's own view.

With regard to what is said about Mill under the first head, it seems to be ignored or forgotten that he has discussed the Import of Propositions at great length in his *Logic*, Book 1. and elsewhere, and has declared (among other things) that "the object of belief in a proposition when it asserts anything more than the meaning of words is generally...either the co-existence or the sequence of two phenomena." This (and other expressions of his view) seems to bring Mill's doctrine naturally under the head of synthesis. And of this 2nd doctrine it may be observed that at least it gives the true account of the matter from the point of view of audience—hearer or reader; and this suggests the further remark that much controversy as to the import of propositions or judgments may be explained by the consideration that it is from different points of view that different theories have been hit upon and elaborated. The author himself observes that the process of apprehending communicated judgments is synthetic (*cf.* ch. 7 of Pt. 4) but he only mentions it cursorily. We may begin with unity and differentiate or articulate it (as the author), or begin with diversity and unify or connect (as Sigwart), or fully recognise the diversity in unity—as in all items of Knowledge that already form part of our "mental furniture." The unity in diversity, or diversity in unity is common to all cases.—The 3rd view is hardly incompatible with the 4th.

As regards the theory of Judgment affected by Brentano and his school—which Mr Jerusalem, after Hillebrand, calls *Idio-genetic*—our author concludes that the view is based upon tautology. According to this view judgment is an unique and primitive psychical act (hence the name *Idio-genetic*) incapable of analysis. In every judgment there is one thing or group which is referred to, and which constitutes the *Materie* of that judgment; the object before the mind in ideating and in judging is the same, in perceiving *S P* and in judging *S is P*, the same identical thing or group is the object of my mental activity—though there is a profound difference between ideating and judging. Judgments or propositions are not formed by putting two ideas together and a judgment need not be two-membered. Judging consists merely in the acceptance or rejection (*Anerkennung* or *Verwerfung*) of a presented content—thus *This plant* is a judgment.—Mr Jerusalem allows that in ideating and in judging *one* object or group is before the mind; and this certainly seems to be indisputable in the case of judgments already accepted (however acquired), and in most cases where a judgment is framed by the speaker himself. He strenuously objects, however, to the doctrine that judgments need not be two-membered. According to him all that we learn from the expositions of Brentano and his school may be summed up in the phrases, An affirmative judgment (= acceptance of an object) is true when its object exists, and An object exists when the judgment which accepts it is true. The acceptance and rejection declared to be the functions of judgment are meaningless unless to *accept* means to *regard as existent*, and to *reject* means to *regard as non-existent*.

Under the 4th head Mr Jerusalem refers to G. Gerber as his source of inspiration, and lays stress upon Gerber's view of the enormous importance of verbal language for the development of Judgment and of Thought generally. He also mentions with approval Mr Bradley's view of judgment, which however seems to me very different from his own, although recognising the forming and objectifying action of judgment.

On passing to the genetic investigation of judgment, we find important parts assigned to Ideation or Presentation, to Feeling, to Will, and to Speech. Some idea or presentation is a primary condition of judgment, but judgment is not an association of ideas; nor is verbal expression, nor even mere disintegrating of the presented content, sufficient to constitute judgment. It is by systematisation and objectification that idea is transformed into judgment. When an idea is presented to us in perception, we are passive and affected; when we think (as in judging) we are active—hence judging includes elements of volition and of passive feeling. It is interest in some presented content that stirs us up to the activity of judging—and this interest may be described as connected with the satisfaction of an intellectual need of activity—a need however which is occasionally satisfied by mere apprehension of an idea. The need would be likely to make itself felt, at early

stages of human development, as an urgent demand for light upon some confused and perplexing presentation or idea, and this demand would find in judgment its natural and only satisfaction. Mr Jerusalem regards the seeking for this form as an act of Will, which aims at reducing the ideational content, with a view to practical ends.—For primitive man, when activity or any manifestation was attributed to any thing, the thing was always regarded (as by children) as a living willing creature. This is explained as due to the predominant force of the Will-apperception mass.—This primitive mythological anthropomorphism, generally regarded as a passing phase, is held by Mr Jerusalem to be of extraordinary interest and suggestiveness, and quite impossible to get rid of altogether.

The attribution of life and will to things is regarded as a result of man's own individual experience, in which it perpetually happens that movements follow directly on impulse or even seem simultaneous with it. The connexion (according to Mr Jerusalem) is so intimate that impulse and movement are essentially one, impulse being but the beginning of movement, and being in fact matter of consciousness only when the movement has begun. He rejects the view that feelings of innervation precede movement, but holds that muscular sensations actually accompany the *idea* of intended movement,—and holds that movement in foreign bodies was naturally regarded by primitive man as the final term of a series the beginning of which had to be sought *within* the moving thing, and had to be conceived by him as volitional impulse. To this may be added a consideration of man's 'biological' interest in his environment, the importance to him for practical purposes of a knowledge of things, especially moving things—the frequent need of communicating information as to observed movements, and the appropriateness for this of imitation in many cases; such imitation would be a convincing demonstration of the dependence of the movement upon conscious impulse.

In such a separation of the movement and assigning of it, as the result of volitional impulse to the thing moving, we have the *schema* of judgment, and an intelligible interpretation and systematisation of the whole presented content.

By this interpretation of what is perceived into an independent thing with a will of its own, the ideational content is objectified.

So far thought might progress without language; but the complete development of the function of judgment, the conception of Quality or Potential Force, the substitution of the idea of centres and manifestations of force for the crude original anthropomorphism, the clear distinction between Subject and Predicate in judgment, the conception of classes of things endowed with similar forces—all this, with its enormous influence on the further development of thought and power of apprehending the world, was possible only by means of language.

The question as to the origin of speech cannot of course receive a detailed answer, but it seems probable that its origin is to be

sought in emotional expression, its further development in the need to understand. Emotional outcries would contain some intellectual elements, and would be understood; the emotional element would, with repetition, fall into the background, while the ideational factor would proportionally gain in strength. The earliest words or roots had comprehensive signification, and only in course of time became split up or differentiated into nouns and verbs. Language could become a complete instrument of thought only when the distinction of Subject and Predicate in Judgment became clearly marked. The feeling-element of Interest pervades all judgment, and judgment is in itself pleasant, according to our author.

After tracing the origin and development of Judgment, he goes on to consider the different forms of Judgment in what he regards as the evolutionary order of their appearance, testing his theory by applying it in turn to Denominative and Impersonal Judgments, to Judgments of Memory and Expectation, to Conceptual, Relational, and Psychical Judgments. He points out that Subject and Predicate in a Proposition are not independent ideas or presentations but closely connected factors of judgment,—the real unit of thought being thus expressed not in a mere name as such, but in a proposition. The analysis however of propositions into *S* and *P* seems indispensable for the due development of thought (as reduction of words to letters is indispensable philologically) and the clear recognition of the function of the Subject in Predication has an important effect in emphasizing and enhancing the independence attributed to objects of Perception. It is also by its means that the idea of potential activity, so valuable in thought, is developed and fixed; and through it again words acquire universality of meaning, making it possible for objects to be thought of in groups. And thus the way is prepared for the formation of Concepts or 'Abstract Ideas.' (I should like to remark here that it seems very difficult to draw the line between Concepts and other ideas, and that we think even of individual objects by means of ideas that are more or less abstract.)

In passing to consider the so-called Impersonal Judgments, it is first of all pointed out that the Predicate as such is always dependent. It is thus incompatible with the nature of the Judgment-function that a judgment should consist of a Predicate only. But it has been thought that such judgments occur in 'Impersonal' judgments—*e.g.* It rains. Has this sentence a Subject? If so, what is it?—The author first considers the views of Miklosich, Brentano, Sigwart &c., contending that the doctrine of Brentano and his school (according to whom Impersonal Judgments are to be interpreted as Existential) is full of confusion and contradiction; and he points out that (1) *It rains* has a different meaning from (2) *Rain is*, (1) containing an implication of *present* fact which (2) does not; also that Existential Judgments are never Judgments of Perception—hence that such propositions as *It rains* cannot be Existential Judgments.—Further on, in considering these

latter Judgments, the author points out that they are two-membered, and that in them Existence is the Predicate.

According to Mr Jerusalem the true force of Impersonal Judgments is to be found in this, that they express a whole process, not that something perceived is named. And the emphatic *Present* of Impersonal Judgments of Perception refers to the spatial environment of the speaker, and it is this environment which is the subject of the assertion. Lotze, Prantl, Bergmann, Schuppe, seem to be of a similar opinion. Thus in Impersonals too, the forming and articulating function of the judgment-act is operative. A process is therein apprehended as a condition of the environment of the speaker. This environment is at first anthropomorphically regarded as *cause* of the process. But soon the anthropomorphism disappears, or keeps its place by the substitution of a Divinity as cause, instead of the environment.—I think it might be suggested that the 'It' of such Impersonals as *It rains*, indicates that while an occurrence is taking place which we regard as the activity of *something*, what that *something* is, is vague, doubtful or indefinite.

In Judgments of Expectation the Future is regarded as existing in germ in the Present. In the present inheres the will, the tendency, the inclination to the future manifestation—we ascribe *e.g.* to an object of present perception a definite tendency, a direction of Will. The verbal expression for this direction of Will is the Future, which in many languages is simply characterised by the verb *to will*.

Ideas of Relation furnish a special class of Concepts and Conceptual Judgments. As Mr Jerusalem remarks, Relative Judgments properly so-called (of which Judgments of Quantity and Number are highly important cases) have received a very scanty measure of attention in most logical text-books—though of course the whole primary force and essential distinction of propositions of this kind falls into the background if they are treated as mere examples of *S is P*. Though *e.g.* $x=4$ may be interpreted as meaning It is a property of x that it is equivalent to 4, yet without doubt what is really emphatic in $x=4$ as ordinarily used is the *Relation of Equality* between the two magnitudes. (As has been pointed out by some previous writers, we are in such propositions concerned with *two* distinct objects or denotations.) Hence it is concluded that the Subject of such a judgment is the relation of Equality between the two magnitudes, and the Predicate is the Existence, the *Vorhandensein*, of this relation. And since Existence means nothing but potential or actual activity, the real meaning of the proposition is, This Relation of Equality between x and 4 will show itself operative in all the succeeding operations.

This interpretation seems to me somewhat strained.

Judgments concerning Psychical phenomena are said to be at first sight in direct contradiction with the author's theory, since in statements like *I rejoice*, *I am afraid*, *I am in pain*, the Force-centre which stands for Subject is certainly not distinct from, and

independent of the person judging ; it seems, we are told, as though in such cases the Force-centre were not objective, but the very essence of Subjectivity. But this objection is of a very harmless character, and it is easy for the author to show that my 'I' though of course for myself 'subjective' is from an universal point of view and for other I's 'objective'—those other I's being objective to me, while subjective each to itself. Thus in these cases too the function of judgment is to form and objectify a given content. But though each 'Subject' is able from the universal point of view to regard himself as just a part of the world, there remains the little *Unbequemlichkeit*—to use Kant's word—about the relation of the Self-cognised to the Self-cognised—and this is not removed by the author's statement that the 'I' and the 'rejoice' in *I rejoice*, signify only the I-concept and the joy-concept. The author's use of the terms *subjective* and *objective* here, seems wanting in clearness. And the relation between the interpretation here put upon Psychological Judgments and the doctrine asserted in ch. 2 of Pt. 1. that "absence of substratum" (*Substratlosigkeit*) is the distinguishing characteristic of psychical phenomena (*cf.* also what is said further on in this chapter about Psychological Judgments) seems to stand in need of elucidation.

The function of Judgment is said to be physically conditioned as regards both Sensation and Volition ; and that we interpret the world as we do is due to the constitution of the objective physical world itself as well as to the special character of our psychical life. Further the Categories of Substance and Cause are declared to be implicit in every Judgment, and the idea of Substance coeval with the idea of Subject of Judgment. It is because in Judgment we transfer to our environment the causal connexion which we subjectively experience, that we are enabled to foretell and to produce changes of physical occurrence.

With regard to the theory of Judgment here set forth, I am inclined to think that present divergence from the anthropomorphism assumed to start with is considerably greater than the author believes—that though Force, Substance and so on are indeed found on reflection to be ultimately implied in Judgment, yet that this implication is in many instances very far from being obvious, and that what alone is in all cases of judgment both indispensable to any significance whatever, and obvious without a process of reasoning, is unity in diversity. If this view of judgment is accepted, then every Subject of a proposition, and therefore every object of knowledge, is a unity which has a plurality of attributes.

As regards the origin of the ideas of Substance and Cause, the question of real interest and difficulty of course is, *How* are they given in experience? and Mr Jerusalem's account of the matter does not solve the problem.—There seems great force in his opinion that the form of judgment which is of general use and value must correspond to the physical constitution of things as well as to the mental, though his contention that *nothing* which appears to us is

mere appearance but always some real aspect of the world seems valueless—because if we take the circumstances of the percipient into account as well as of the perceived, the assertion though undoubtedly true is trivial, if what is meant is that in all perception objectively correct knowledge of the matter of perception is obtained, this seems clearly inadmissible.

The author feels strongly that neither the physical nor the psychological element in experience can be given up or explained away, and he accepts as most in accordance with observed fact and most satisfactory philosophically the belated doctrine of the direct interaction of Mind and Matter. He asserts this repeatedly and in set terms, referring to Will and Movement as psychical and physical factors respectively—we start with the Will of which we are conscious in ourselves, and are led to accept a Divine Will as the *fons et origo* of force where conscious impulse seems lacking, and as providing the unification and source of all phenomena.

This final outcome and chief point of Mr Jerusalem's theory is however but barely indicated and very slightly elaborated—Leaving out of account the difficulties of the relation between Mind and Matter, it may be said that the complete failure to meet—indeed perhaps even to recognise—the problem which may be indicated as that of “the One and the Many” marks this as an entirely inadequate theory of the universe. And there seems a serious difficulty about the relation of Will to Mind and Matter, and about the Meaning to be attached to Will; for since it is through the attribution of Will, or as Force-centres, that objectification is induced upon the matter of external perception, and since it is in virtue of this objectification that we recognize Substance and Causality in the physical world, and since our only direct experience of Causality or Will or Force is said to be in ourselves: I suppose the only meaning that can be given to the denial of any substrate or substance in *psychical* phenomena is, that the one sole substance is Will, and that that Will is God, in whom (or which) physical and psychical are all conjoined and co-ordinate. On the other hand it has been clearly indicated that Will is regarded as psychical—and again, much of what is said tends to the exaltation of the physical in comparison of the psychical.

Mr Jerusalem's chief strength seems to lie in his powers of exposition and of psychological observation and imagination; and whatever may be thought of his metaphysical opinions, the interest and value of much of the psychological part of his work, both analytic and genetic, cannot I think, be doubted. The book as a whole is delightful reading, and full of freshness and suggestion. Even some views and statements which seem to me mistaken are probably in part due to keenness of analysis and truth of observation—for instance the distinction of psychological phenomena as *substratlos*, and the refusal to regard such phenomena as the subject of judgment in the same way as material phenomena.

It is about the account of the relation between Body and

Mind that the chief faults of the book seem to gather; e.g. the doctrine of the direct interaction of Body and Mind, as deduced from the experienced juxtaposition of impulse and movement: the view that *mere events* (what does *event* mean?) can affect Force-centres: and the distinction drawn between psychical and physical phenomena as regards their relation to apprehension and to judgment.—It appears to me that from the psychological point of view, judgments of psychical and of physical fact are on just the same footing, and that there is no essential difference between the modes of apprehension in the two cases, except in the case of Pleasure and Pain. In our present stage of development, physical facts are surely, very often at least, matter of intuition—as far as consciousness goes; and if I say, e.g. *I am in a great hurry*, or *I am going to London to-morrow*, is not this Subject—I, as immediately referred to, as distinct from the Predicate, and as definite a Force-Centre, as any Subject of a Judgment concerning physical objects? And is not the Substance of physical objects, as distinct from their attributes, an inference?—It may be said that there is no appeal from a man's consciousness of his own states, but perhaps even this is not always true; and if it is, it is equally true (as far as *Perception* goes) of the perception of physical objects.

I have not attempted to consider Part 5, concerning the Validity of Judgment, and ch. 1 and 2 of Part 6, in which are discussed the relation between Psychology and Theory of Knowledge, Critical Idealism, and a work of Avenarius. I have also left untouched various special points of importance.

E. E. C. JONES.

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I. *Étude philosophique sur la doctrine de saint Paul* (Renouvier).

THE Apostle's religious ideal of faith, hope and charity is explained by M. Renouvier with force and clearness, in a study which possesses much didactic value. But when one frees himself from the charm of style and from the power of religious appeal, the question of the strictly philosophic worth of the article arises. That man lieth in wickedness, and that an escape can only be found by union with a higher power through love or charity (*ἀγάπη*), is urged with eloquence, but this is scarcely the ethical point of view. The sin of humanity was a state to be remedied according to St Paul: according to the ethical thinker it is to be explained so as to satisfy the reason. M. Renouvier is scrupulously just in showing that St Paul was uninfluenced by the Neo-Platonic ideas adopted by early Christianity, and his criticism tends to prove that the Apostle shut himself out from the philosophic point of view. To him all philosophy was vanity compared with

the cry of the heart for redemption and freedom from its load of sin; and everything in his teaching is subordinated to the religious sentiment. Hence anyone who realizes the full import of the term philosophy recognises that the two points of view are widely separated; and it is precisely St Paul's steady avoidance of metaphysical problems, that enables him to inculcate his precepts of morality. His teaching is wholly didactic; it aims primarily at making men better; whereas speculative ethics can only hope to solve the problems the religious teacher avoids, and possibly, indirectly, to influence men's actions by pointing to a high Ethical ideal.

II. *Le Phénoménisme neutre* (L. Dauriac).

M. Dauriac's article deals with *L'Idée du Phénomène* by M. Boirac, which has already been noticed in *Mind*, so that it only remains to estimate its importance from the point of view taken by M. Dauriac in *L'Année Philosophique*. M. Dauriac lays great stress upon the fact that M. Boirac is a convert from the school of Kantian critics, and he is ready to receive the deserter with open arms. But one must ask to what "school" or mode of thought has M. Boirac been converted, and it evidently grieves the friendly critic that he cannot reply to Empiricism, only to Phenomenalism, or the theory that only Phenomena can be known. This Phenomenalism, moreover, according to M. Dauriac is "neutral," or in other words it takes no side in the discussion of metaphysical questions; in fact M. Boirac gives free choice between the conclusions of Hume and Renouvier. Further, not being an avowed Empiricist, he cannot adopt the method of Mill, and "Phenomenalism" is to be established, not by observation and experiment, but by a historical criticism of preceding systems; in the course of which survey the noumenon appended to each is discovered to be either useless or self-contradictory. Phenomena, then, being isolated, have the whole metaphysical world before them—to conquer or at least to defy. Being unwilling to accept the aid of any recognised system, they are metaphysical derelicts until M. Dauriac takes them in tow towards the natural haven of Empiricism. Although M. Boirac has been careful not to commit himself, it is not difficult to see that this line of thought has influenced his speculation throughout. "The only realities that can be known," he writes, "are phenomena, and relations, more or less constant, between phenomena, of resemblance, difference, co-existence and succession." However much he may desire to be "neutral" he writes from the empirical standpoint; and having, by this means, made sure of his phenomena, he can well afford to profess to leave the question open; when, so far as he himself is concerned, it is already decided. Indeed, one side of the controversy over phenomena reminds one of an old-fashioned cookery recipe for hare-soup, which begins with the sage advice,

"first catch a hare," and similarly in philosophy the whole question turns upon how one "catches" his phenomenon. If the phenomena are to be taken as "ready-made," the question of workmanship cannot be investigated; and if, moreover, the relationships between them are only "more or less constant," there is no place for universality, necessity or absolute knowledge, which would find sorry comfort in any dictum that includes a "more or less." Plainly then M. Boirac favours the Empirical line of thought, and it only remains to estimate how far he has improved its position by his advocacy.

From the point of view of M. Boirac, the difficulty is to individualize his phenomenalism. With Mill and the strictly "Psychological School," it was often a puzzle to *generalise* without interpolating elements foreign to those employed in the genesis of the individual, and here M. Boirac has recourse (for the present) to a kind of phenomenal Monadology. But the experiment is neither clear nor happy, for it is difficult to see how Monadism can be adapted to Phenomenalism, since the combination must unite two utterly heterogeneous elements. The doctrine of substance is the especial *bête noir* of the phenomenalist, and yet it is precisely this theory that is the kernel of the Monadology—if the system of Leibnitz be phenomenalized it fails to help M. Boirac in discovering an individual phenomenon or in finding a consciousness, and upon the other hand it can only help him by destroying the essentially phenomenalist character of his teaching—there is no Monadism *without* substance, there is no Phenomenalism *with* substance. In fact, the problem of consciousness is a stumbling-block to M. Boirac; for how is it to be related to Phenomena? Without some kind of consciousness there can be no phenomenon; with consciousness, as an added ingredient, Phenomenalism is liable to be forced back to the provisional Idealism of Mill or the Empirical Idealism of Berkeley, and thus *ipso facto* ceases to be Phenomenalism.

It therefore appears that the position of neutrality is untenable. It is an armed neutrality with too many interests at stake to maintain indifference for long. The whole series of what M. Dauriac terms "the *isms* of metaphysics" are drawing it in one direction (even if only as objects of belief), and it is really the force exerted by these, reacting against the Empirical results, that produces an illusory appearance of apparent stability or neutrality. If Phenomena, that can be known, gain the day against Noumena, that are only believed, the result will probably be scepticism: if, on the contrary, the beliefs or possible beliefs are victors, they will break through the cordon of phenomenalism and establish a dogmatic system beyond.

III. *L'Évolution de l'Idéalisme au XVIII^e siècle—Spinozisme et Malebranchisme* (F. PILLON).

It is little wonder that Spinoza's system remained so long misunderstood, when, even to the present day, there are many points that constitute an open field, where the last champion only holds his ground until a fresh challenger appears. No question has been more debated than the relation of Substance to the Attributes, and of the Attributes to each other. Every writer of an important History of Philosophy has a new theory to advance, and now the primacy of "Thought" maintained by Erdmann is answered by M. Pillon's counter-claim in favour of "Extension."

M. Pillon belongs to the more subtle commentators of Spinoza, who admit that Spinoza himself held the equilibrium of the Attributes, but that unconsciously or implicitly he loads his balance in favour of one of them, in this case of Extension. "Despite," M. Pillon writes, "this demonstration of the reciprocal independence of the two series [*e.g.* *Ethics*, III. Prop. 2 and Note] it remains that the representative series [thought], just because it is representative, is subordinated to the series represented" [extension] (p. 144). This is, in brief form, the argument for the primacy of Extension; but, condensed as the argument is, it contains several implied statements, that admit of discussion, if not of denial. First, is "that which is represented" prior to that which represents? For if this be so, how can the mode of extension be "logically prior" to the mode of thought, and how can the latter *represent*? for, surely representing implies activity, (and here M. Pillon's exposition is in accord with Spinoza, for the ideas are active processes, *Ethics*, II. p. 43), and that which is represented must be logically *subsequent* to the act of representing (just as the result of action is subsequent to the action), hence, what was logically prior, has become logically posterior, to Thought. Or to put the matter briefly—M. Pillon asserts that the represented must be prior to the representing, but why not, on the contrary, the representing to the represented, the act to its result, idea to ideatum? Thus M. Pillon's argument tends rather to undermine than to establish his conclusion. But a deeper question remains; how far is he justified in introducing the question of "representing" into the discussion? The following are the passages where this point of view is developed—After the definition of adequate and inadequate ideas, the argument continues, "Adequate ideas cannot but be true, because they *represent exactly* the real being which corresponds to them. Error arises from inadequate ideas, *imperfectly representative*" (p. 136). "Everything in the psychology of Spinoza returns and is reducible to this simple distinction between adequate and inadequate ideas" (p. 137). "In the study of this psychology one is struck with the extreme importance assumed by the representative character of the attribute Thought" (p. 138). "Thought is reduced to ideas, and ideas only differ in the inequality of their representative value" (*ibid.*). "Spinoza at once admits,

that the conceptions of our intelligence, provided they are clear and distinct, *represent the truth infallibly*; in other words, that the human understanding is a *species of mirror, where clear and distinct conceptions form images exactly like real objects*. Hence the philosophy of Spinoza cannot but be a realistic dogmatism" (p. 139). Now if the reader follows M. Pillon's train of thought, he will see that the representative value of adequate ideas, in the first passage quoted, refers to "real being," and that at the end it takes on the additional meaning of a mirroring of images "exactly like real objects"—a transition from the guarantee of truth to the conformity of ideas in consciousness to that which is beyond consciousness and that never can appear in it. Now Spinoza himself decides against the second interpretation, when he looks upon the comparison of an idea to a "painting upon panel" as an absurd suggestion, and this simile gains additional weight from the fact that the Dutch and Flemish Schools of his time alone aimed at reproducing real objects as they were.

But, further, the introduction of "representation" seems to misrepresent the whole outlook of Spinoza. He himself expressly denies that the test of an adequate idea is the agreement of idea and ideatum (*Ethics*, II. Def. 4, Prop. 5 &c. and confirmed in Letter LXVIII B.) and hence, as pointed out by Prof. Windelband, an adequate idea by no means depends upon its ideatum—indeed, if this were so, the isolation of the attributes would be broken; they would be connected together and therefore false to their definition, being conceived not each *per se* but *per aliud* (i.e. by the modes of the other attribute). Moreover, the whole gist of Spinoza's system consists in the postulate or assumption, that what is clearly and distinctly conceived in an idea is so in being. This is the highest verity, the identity of being and thought (in the sense of an adequate idea), and obviously it could gain nothing from any representative nexus or order between the two series; in fact, to disavow this position in favour of the primacy of Extension would be to undermine the whole doctrine of Substance.

While dissenting from M. Pillon's argument, there is much to be said for his conclusion, with the qualification that, instead of a categorical, it should form one side of a disjunctive proposition. Spinoza himself intended to maintain the equilibrium of the Attributes, but when a system proposes a Substance as the sole infinite existence, and when the finite modes are grouped under two independent attributes that are connected with the finitude of the modes upon one side, and with the infinity of Substance upon the other, it is obvious that chasms must occur and that some sacrifice must be made to bridge the gulf. This sacrifice may take the shape of subordinating either attribute to the other—Extension to Thought or Thought to Extension—and M. Pillon's position is of great value in pointing out the possibility of the latter attitude. The subordination of Extension to Thought has found many advocates from Tschirnhausen to the

present day. But, like the opposite course, neither absolutely excludes the other; both are historically possible. As long as Spinoza had not emancipated himself from his earlier point of view, he himself gives precedence to Extension, and, according to Dr Martineau, he must still give it, as long as he is engaged with the Occasionalistic problem of the relation of mind and body¹. When, moreover, the question of the representative value of thought arose, and thinkers demanded something beyond the essence of an idea as the test of truth, the current might (as M. Pillon indicates) set in the same direction. Upon the other hand, the activity of thought as idea, the idea of an idea, the insight of "intellect" into substance (whether intellect be understood as mind the mode, or infinite intellect), all show the opposite tendency. Indeed, the balance of the attributes seems to have been the result of a balance of two opposite tendencies in Spinoza's own mind, the earlier dominance of Naturalism giving way to the deductive rights of thought, and it would be interesting to learn whether "Thought" would have asserted itself against Extension, if Spinoza had lived to answer the questions which he puts aside, for further consideration, in his correspondence.

If then the view be defensible, that an Idealistic or Materialistic conclusion can be drawn from Spinoza, it brings us to one of the most interesting, if not the most interesting problem in the history of Modern Philosophy before Kant. Did space permit, it would be easy to determine how the Greek conception of man was broken into two separate momenta, one of which appears in the empirical method of Bacon and the other in the rationalism of Descartes. Like two streams that issue from the same water-shed, the earlier courses are not far apart, but the difference increases until at last each empties itself upon opposite sides of a continent. So Materialism may be traced back to Bacon and early Idealism to Descartes. In the earlier stage Bacon leads to Locke, and Descartes to Spinoza. From what has already been said, either Idealistic or Materialistic tendencies might have originated from Spinoza, and the same remark applies, with certainty, to Locke. There were thus four courses open, deductive Idealism and Materialism derived from Spinoza, and empirical Idealism and Materialism derived from Locke. Now the problem of historical interest arises, why is it that the empirical line of thought, in both branches, ousts its rivals from the course of philosophic development? French Materialism and Berkeley's Idealism were both derived from Locke, but Spinoza's doctrine failed to gain the modifications of which it was susceptible. It is futile to reply that Spinoza's thought was more difficult and less attractive than that of Locke, for the tinge of mysticism that forms the aureole of Idealism has never deterred adherents by difficulties of interpretation. The cause must rather be sought in the odium that was heaped upon Spinoza, a last trace of mediæval

¹ *Types of Ethical Theory*, Bk. I. Chapter 3, § 7.

prejudice against "the unhallowed deeds of Jews." It was this prejudice that delayed the printing of his books, restricted their circulation, and vilified his teaching. Hence it is little wonder that there were none so poor to do him reverence in developing his teaching; and thus the half-completed conclusion is supported by arguments drawn from a different source. This historical gap, it may be remarked in passing, is an argument against any rigorously *a priori* evolution of the history of philosophy—unless it could be proved that there were internal reasons for Spinoza's system hibernating for over a century! But, upon the other hand, it is important to remember that thought can never die, and that, if Spinoza's system was suppressed in the eighteenth century, he gains his reward in the post-critical philosophy, when any system that depends upon "Thesis, Antithesis and Synthesis," repeats the mutual exclusion of the Attributes and their identity in Substance in a progressive and evolutionary, instead of a substantive order.

Closely connected with the historical position assigned to Spinoza is M. Pillon's placing of Malebranche. "He is generally made," M. Pillon says, "a disciple of Descartes leading to Spinoza; he is therefore placed between the two as a connecting link; whence the reader is liable to take from his philosophy an apparent character of inconsequence and indecision, which gives a false idea of it. The truth is that by the date of his works, he comes after Spinoza, and that he abandons or corrects precisely those Cartesian principles that are fundamental to Spinozism. Malebranche, like Leibnitz, is a reformer of the Cartesian philosophy. Both the Leibnitzian and Malebranchian reforms are independent and very different from each other. We hope to be able to show that they mutually complete and rectify each other. We may say that that of Malebranche is as complete and as profound as that of Leibnitz. Both together contain a refutation of the system of Spinoza" (p. 170 note). There are thus two grounds for placing Malebranche after Spinoza, depending upon the respective dates of the works of each and upon the statement that the philosophical views of Malebranche are more advanced than those of Spinoza. First, as regards the dates, the chief works of Malebranche appeared during the years 1674-88 and those of Spinoza during 1670-7. But when the untimely death of the one is compared with the long life of the other, it is not too much to say that the chronological argument is not conclusive; and that, the difference being so slight, the order of classification will be largely a matter of convenience. In regard to M. Pillon's second argument or series of arguments, he places a fair critic in a difficulty, since it would be manifestly unfair to pass judgment upon the relation of two philosophies when one of them remains still to be expounded. But there are several points upon which M. Pillon has already been explicit, and these must suffice, for the present, in estimating his point of view. First, all positions are relative, and it must not be forgotten that M. Pillon has altered that of Spinoza, moving him nearer to

Descartes and farther from Leibnitz. Owing to this retrograde movement, Malebranche is, as it were, crowded out in the earlier sequence, and room must be found for him in the later. But if the view already taken be tenable, Spinoza is not altogether "a realistic dogmatist," and there is no need to postpone the hearing of the case of Malebranche. Moreover, as an *argumentum ad hominem*, it may be mentioned that M. Pillon frequently asserts that the whole philosophy of Malebranche is anti-Spinozistic; now if this be so, how is the title of the series of articles justified, for no one has yet defined "evolution" as an oscillation from contrary to contrary? It would be premature to further investigate the "corrections" of the doctrine of Spinoza due to Malebranche, but there is one point upon which emphasis is laid, which is open to present enquiry. M. Pillon clearly shows the difference between the position of the will in the two systems; with Spinoza it is a phase of intellect, with Malebranche it has a distinct place, and hence leads to an ethical system. Upon this, again, it may be remarked that the classification is a matter of taste; but in assigning the value of a criterion to Ethical teaching in the seventeenth century, M. Pillon seems to interpolate later thought into the earlier period. The distinctive character of Modern Philosophy before Kant is the placing of the centre of gravity in the Metaphysics to which Ethics are a dependent supplement; and consequently too much weight should not be given to the Ethics of Malebranche apart from his Metaphysics, indeed it has frequently been pointed out that the two are by no means coherent; and, when the choice must be made between them, the whole tendency of the time gives the casting vote to the Metaphysics.

W. R. SCOTT.

VIII.—NEW BOOKS.

The Elements of Ethics. By JAMES H. HYSLOP, Ph.D., Instructor in Ethics, Columbia College. New York : W. Blackwood and Sons, 1895. Pp. vii. 470.

THIS volume is described by the author as an "introductory treatise on the fundamental problems of theoretical ethics," in which "the analysis of various questions has been made as complete as reasonable limits would allow, with the special purpose of trying to throw some light on the perplexities of ethical theories, and to present the author's conclusions regarding them." After an introductory chapter on the definition and scope of the science, and a sketch (seventy pages in length) of the history of Ethics, successive chapters deal with "Elementary Principles," the "Freedom of the Will," "Responsibility and Punishment," "the Nature of Conscience," the "Origin of Conscience," the "Theories and Nature of Morality," "Morality and Religion," and the "Theory of Rights and Duties." The treatment follows pretty closely in the wake of the familiar controversies between libertarians and determinists, intuitionists and empiricists, hedonists and anti-hedonists; and the author is often successful in drawing distinctions and clearing up obscurities which some of the controversialists have overlooked. On the whole it is perhaps to be regretted that he did not restrict himself, even more than he has done, to one or two special questions on which much might be done by clearing up the obscurities due to old controversies which now have either lost their interest or appeal to us from a changed point of view. But the exigencies of a volume which seems intended to serve as a text-book for students, have led to a somewhat more comprehensive scheme, which is not all worked out with the same fulness and accuracy.

Even in the introductory chapter there is some want of perfect clearness. Ethics, as a science, is said to be "a name for the observation, classification, and explanation of certain phenomena" (p. 1), namely, of "the phenomena of human character and conduct," supplemented by reference to man's environment. This suggests the view of ethics as simply a science dealing with a certain body of facts and not clearly distinguishable, now from psychology, now from sociology. But immediately certain characteristics of ethics are given: it is said to be a science of values, to have to do with the Ideal as contrasted with the Actual, and to be Legislative or Normative (pp. 4—6). Ethics by its definition is made a Science of phenomena—observing, classifying, explaining them—; but its "characteristic" is not to have to do with the actual but with the ideal, to be a science of values and normative. One possible explanation of the inconsistency is that two different aspects of ethics—theoretical and practical—are being referred to. Thus Dr Hyslop says (p. 13): "Theoreti-

cal Ethics employs the explanatory or scientific method ; practical Ethics the normative or regulative method." But the characteristics described on pp. 4—6 are evidently intended as characteristics of the subject treated in the present volume, and that is said to be theoretical, not practical ethics. Another sentence suggests a different view : "the fact that there are certain ends, such as perfection, goodness, happiness, or honesty, temperance, purity and the like, which we can and do feel we ought to aim at, attests the existence of a phenomenon of great importance to moral science" (p. 6). The suggestion seems to be that the ideal or estimate of value or law of conduct, is itself a fact of consciousness, and that this is the order of phenomena with which Ethics has to do. But it is merely a suggestion ; and it would be unfair on so slight a ground to attribute to the author a statement which would vindicate the consistency of his different expressions only by obliterating the distinction between fact and value of fact, actual and ideal—the very distinction which he had just been at pains to point out.

The long chapter on the "Origin and Development of Ethical Problems" hardly fulfils the expectations raised by the title. Instead of simply marking out the way in which different problems arose and the manner in which their aspect changed in the history of thought, the author follows pretty closely—though not quite exactly—the historical order of philosophical authors. His chapter is, therefore, a condensed sketch of the history of Ethics. As such it can scarcely be called satisfactory. There seems a tendency to sacrifice the precise nature of certain historical systems to the exigencies of a method of classification which has always present-day controversies in view. There are besides various inaccuracies, obscurities and omissions. As an instance of omission it may be mentioned that the account of Aristotle's ethics contains no reference to the function of the *φρόνιμος* in determining the due mean in which virtue consists ; while the account of the English moralists makes no mention of their most characteristic thinker, Bishop Butler, who is, however, afterwards (p. 260) incorrectly referred to as having made "Conscience wholly an emotional capacity." Sometimes, also, the statements are much too vague or loose to be of any value. Thus it is said (p. 81) that : "Locke did not exactly follow the lines of Hobbes' speculations" [concerning the origin and nature of political authority]. No student could gather from such a sentence (nor is the information supplied elsewhere) the clear opposition in which Hobbes and Locke stood to one another regarding the relation between the law of nature and the state of nature. The sentence on p. 69 "Berkeley had disputed the existence of matter, and Hume on the same grounds disputed that of mind, causality, personal identity, &c., leaving nothing but 'impressions,' or experience, as the data of knowledge" is a series of confusions, each clause in which would require a commentary. Another sentence on the same page has completely puzzled me ; I hope I am not doing wrong in blaming the American printers for it ; in other respects they have not done their part well for this volume. The same chapter contains the assertions that Spinoza "represents a purely materialistic conception of the universe" (p. 66)—although he is classed with the idealistic movement, and said to have "set up moral principles of a decidedly subjective character" (p. 64) ; that, according to Hume, "ideas...denote relations of things" (p. 84) ; that the school of "Cudworth, Cumberland, Price, and Clarke," had as its common characteristic "hostility to the conventionalism of Hobbes on the one hand, and to the experientialism of Locke on the other" (p. 81)—although Cudworth was dead and Cumberland's *De Legibus Naturae* published before Locke's *Essay* appeared.

No dates are given in the book by means of which the reader might correct this slip for himself.

The remainder of the volume seems to me of better quality than the introductory chapters. There is, for instance, a good criticism of Kant's view of the nature of Conscience; and there is much painstaking analysis in the chapter on the "Freedom of the Will": although the latter chapter does not seem to me to carry the analysis far enough into the subjective conditions of voluntary choice. The opinion expressed, in the chapter on the "Theories and Nature of Morality," that "Neither perfection nor happiness, taken alone, is the highest good....The moral ideal is synthetic or complex, made up of elements which alone cannot satisfy the conception of morality," is at least interesting as an index of the trend of opinion of many writers at the present time.

W. R. SORLEY.

Hedonistic Theories from Aristippus to Spencer. By JOHN WATSON, LL.B., Professor of Moral Philosophy in the University of Queen's College, Kingston, Canada. Glasgow: James Maclehose & Sons. London and New York: Macmillan & Co. 1895. Pp. xiii., 248.

Professor Watson has here given us a series of essays on the hedonism of the Sophists, Aristippus, Epicurus, Hobbes, Locke, Hume, Bentham, J. S. Mill, and Spencer. The first part of each essay consists of a clear and concise, if, as in the case of Hobbes, not always adequate, summary of the theory discussed; while the second part is in each case a criticism of the theory from the standpoint of the ethics of 'self-realization.' The author's general objection to hedonism, as stated in the Preface, is that it cannot "plausibly explain morality without assuming ideas inconsistent with its asserted principle." His arguments against the older forms of hedonism are all familiar ones,—and, by the way, whatever one's opinion of Locke as a moralist, many people would not allow that pointing out his determinism constitutes a *reductio ad absurdum* of his doctrine. The best thing in the book is the criticism of Spencer. Professor Watson seems to us to spend too much time over the superfluous task of showing how little is gained for ethics by the 'physical' and 'biological' way of regarding conduct; but he makes some excellent points in discussing the remainder of the *Data of Ethics*. For instance, he objects to Mr Spencer's ideal society in the following terms: "In the ultimate form of society conduct will be perfectly 'heterogeneous.' Does this mean that there will be even a greater division of employments than exists at present? If so, will the conduct of the individuals composing society not be less heterogeneous than it now is, although society as a whole will be more heterogeneous? Is it meant, on the other hand, that each man will discharge more functions than he now discharges, that while the individual will be more heterogeneous in his conduct, society will be less heterogeneous? Again, while it is said that there will be a perfect adaptation of the individual to society, will this adaptation result from a simpler form of society, or from the greater development of the individual? If the latter, how can we put a term to that development and view any form of society as final?" [pp. 215, 216]. Again, on p. 220 he shows with admirable clearness the weak point in Mr Spencer's definition of the moral consciousness as the control of simpler by more complex and representative feeling. Dread of punishment is not a moral motive; dread of inflicting suffering on others is. Where is the criterion by which Mr Spencer makes the distinction?

One's comment on Professor Watson's book as a whole is that it lacks unity. The separate essays are good and helpful; but why not have

supplied a chapter discussing hedonism in general, summing up the objections scattered through the book, and showing more precisely the relation of one form of the doctrine to others? It is not evident, either, why the theological hedonists should have been left wholly out of account. The author's style is popular, occasionally descending to a cheerful familiarity, as when he conjectures that under certain circumstances the Sophists "would...have found Athens too hot for them." In spite of the defects we have noted, its simplicity and conciseness will make the book a valuable help to students beginning the history of ethics.

MARGARET WASHBURN.

Essays and Notices. By T. WHITTAKER. London: T. Fisher Unwin, 1895. Pp. viii., 370.

The Essays published in this volume are of a very miscellaneous character. They are for the most part reprinted from *Mind*, and many of them are mere book-reviews. The most important is the first, entitled "A Critical Essay in the Philosophy of History." The point discussed is how far the continuity of historical progress from ancient to modern civilisation is broken by the Middle Ages. The general result is "that the return of Europe to light has much more the character of an intrinsic process than the descent into the dark ages. The causes of both transitions are discoverable. In the first, an extrinsic cause gives its character to the movement, whereas in the second the movement is correctly described as a return." (P. 38.) The return was of course not a mere return, but one which was modified by new political, social, and other conditions, which had emerged in the mediæval period. The 42 pages occupied by this Essay are full of interesting matter, and deserve the attention of all who are interested in the philosophy of history. Next in importance is the Essay on "Volkmann's *Psychology*," occupying 48 pages. This is a very clear and correct exposition, and should be of great use to any one who is entering upon the study of the Herbartian development of psychology. The Essay on "Philosophical Antinomies" contains an excellent criticism of Renouvier's point of view. An interesting discussion on the subject between M. Renouvier and the author is published in the Appendix. Other Essays of special interest are that on "Idealism in England in the Eighteenth Century," containing a review of M. Lyon's book on the subject: that on "The Problem of Causality," which deals with the work of Dr E. Koenig: and the two Papers on Giordano Bruno.

The Unity of Fichte's Doctrine of Knowledge. By ANNA BOYNTON THOMPSON. With an Introduction by JOSIAH ROYCE, Ph.D. Radcliffe College Monographs, No. 7. Boston, Mass.: Ginn & Co., 1895. Pp. xx., 215.

This is a sympathetic, indeed, an enthusiastic exposition of the main points of Fichte's philosophic system. From a careful study of Fichte's various works Miss Thompson concludes that the different statements of his doctrines are all in harmony, and that the system is unitary and consistent throughout. The key to his position is that reality is a structure upon a single plan, a logical whole. Given one element, and the whole universe can be deduced from it. The apparent differences between Fichte's conceptions in the earlier and later periods of his life are merely due to a difference of standpoint. In the former, the philosopher was engaged in proving the unity of reality and its final basis in the Absolute; in the

latter, he was showing that this unity and "God, its head" were but logical inferences, with no existence *extra mentem*. The Fichtean doctrines of sensation, space and time, together with other details of his system, are worked out upon this hypothesis. Much space is devoted to a discussion of the striking applications of the system in ethics. Here are vividly portrayed the practical advantages of a belief in the teaching that we are parts of an infinite strength, which works in us and through us, and on which we may rely for unlimited inspiration and assistance.

Fichte is vigorously defended against the charge of solipsism and self-creation. The first charge fails to recognise that what Fichte states to be the sole existence is not the individual, but the absolute Ego. The second has arisen because the logical progress from the individual to the universal, from the isolated element to the unified system, has been mistaken for a process in reality itself.

A valuable Appendix contains a colligation of the passages in the various works which deal with important and disputed points in Fichte's doctrine. This appendix, which forms the larger portion of the volume, should prove particularly useful to the student of the Fichtean phase of post-Kantian Idealism.

Miss Thompson's Essay will undoubtedly serve to remove many difficulties from the path of the beginner in philosophy. In the mind of the more mature reader, however, a doubt as to the exact relation obtaining between the individual and the absolute Ego must still remain. No method of logical thinking can make it clear how the Absolute can be at once a source of strength and life to the mind that thinks Him, and—nothing outside of the mind at all.

W. B. PILLSBURY.

Studies of Childhood. By JAMES SULLY, M.A., LL.D., Grote Professor of Philosophy of Mind and Logic, University College, London. London & New York: Longmans, Green & Co., 1895. Pp. viii., 527.

"The following Studies are not a complete treatise on child-psychology, but merely deal with certain aspects of children's minds which happen to have come under my notice, and to have had a special interest for me. In preparing them I have tried to combine with the needed measure of exactness a manner of presentation which should attract other readers than students of psychology, more particularly parents and young teachers" (Preface). An examination of the intellectual factors of child-life, with stress upon imagination, includes indications, illustrated by anecdote, of the early forms of the leading concrete ideas of Nature, Self, and God. The emotional side of child-life is taken up in tracing the sources of childish fears; and is further treated in connection with two studies of the moral life of children, 16 pages of which are devoted to the interesting and subtle topic of "Children's Lies." Notice of matters related to the æsthetic consciousness concludes the account of general characteristics; one study being based upon the remarkable set of drawings by children and savages, which Professor Sully has collected from a wide area, and subjected to scientific scrutiny and comparison. Some of the facts concerning the front and side view of the human figure are especially curious. The two concluding studies give individual histories,—one as an example of fairly representative development, the other as an instance of singular and remarkable development, exemplified in the early days of George Sand.

HUBERT M. FOSTON.

A Short Study of Ethics. By CHARLES F. D'ARCY, B.D. London: Macmillan & Co., 1895. Pp. xxvii., 278.

This little book is intended to serve as an introduction to philosophical ethics; and in certain important respects it is admirably adapted to this purpose. It is clearly and simply written, and interesting both in matter and manner; and it contains a good deal of careful and unpretentious discussion of ethical topics.

On the other hand, neither the main outlines nor the details of the discussion give evidence of much originality. The reviewer, no less than the author, "finds it impossible to express adequately the greatness of the debt" which this book owes to Green's *Prolegomena to Ethics*. Green's argument, on the whole, is closely followed; and, where the author deviates from the track, his speculations cannot always be said to gain in vigour or precision. There is room, no doubt, for an intelligent popular account of Green's *Ethics*; and perhaps Mr D'Arcy might have done better to present his work under this, its more natural guise.

As an ethical text-book, the present volume can scarcely be regarded as an improvement upon three others, of which the author himself speaks with commendation, and which he claims to supplement by expounding their 'metaphysical basis.' Many readers will learn with surprise that Professors Dewey and Mackenzie, and Mr Muirhead "build without a foundation"; and those who are not surprised may be misled. An account, contained in eighteen pages, of such matters, among others, as 'Subject and Object,' 'Relations and Things,' 'Object and Cosmos,' 'Experience and Nature,' and the 'Personality of God,' can hardly be expected to form a very useful or satisfying preface to a 'Study of Ethics.' Mr D'Arcy's metaphysical chapters are too slight to be very convincing; and, considered as an argument, this 'foundation' itself may be thought to stand in no small need of support. This first 'part' is perhaps the least fortunate section of the book.

The last two 'parts' of the volume are better conceived than the first, and contain a good deal of judicious exposition and criticism. The author shows considerable familiarity with recent ethical literature; and his book, on the whole, is one of merit and ability.

CHARLES DOUGLAS.

Introduction to Physiological Psychology. By Dr THEODOR ZIEHEN, Professor in Jena. Translated by C. C. VAN LIEW, Ph.D., and OTTO W. BEYER, Ph.D. London: Swan Sonnenschein and Co.; New York: Macmillan and Co., 1895. Pp. xiv., 305.

This is a translation of the second, revised and enlarged, edition of Professor Ziehen's book. Besides making minor additions and corrections in many places, the author has added a new chapter upon feeling-tone and emotion (pp. 174-197).

It was pointed out in a review of the first edition of the translation (*Mind*, N.S. II., pp. 542, 543) that the English rendering was neither accurate nor idiomatic. The same criticism holds of the second edition. Of the mis-translations and inelegancies marked by the reviewer on the first 36 pp. of the earlier volume, only one is amended in the later. The words 'motory' and 'incitation,' which were charitably interpreted as misprints, remain in the revised text.

"The terminology of this translation," we are told, "holds, so far as possible, to already established precedents." No precedents are cited, however: and the reviewer is unaware of any for such renderings as "minimum of excitation" = *Reizschwelle*, etc., etc.

On Memory, and The Specific Energies of the Nervous System. By Professor EWALD HERING. Chicago: The Open Court Publishing Co., 1895. Pp. 50.

The translation of these two well-known papers shows both the good and bad points of the translations recently issued by the Open Court Publishing Co. The English rendering is accurate: but it is not English. Here is a sentence, taken at random from the body of the book: "The animal kingdom exhibits an inexhaustible multiplicity of form, and to a layman who is not initiated into the science of biology it seems almost incredible that living creatures, so manifoldly different in their forms and habits, should, as germs, in the first stage of their development, be so homomorphous"!

Evolution in Art: as illustrated by the Life-Histories of Designs. By A. C. HADDON, Professor of Zoology, Royal College of Science, Dublin. London: Walter Scott, 1895. (The Contemporary Science Series.) Pp. xviii., 354.

This little volume is full of matter of great interest and value to the psychologist. It first deals with the decorative art of New Guinea, giving the results of the author's own independent research. It then proceeds to "select examples from every age and clime in order to illustrate the life-histories of a number of designs." After this comes a discussion of the "reasons for which objects are decorated." Finally, hints are given as to the most fruitful methods of studying the subject. What is most interesting throughout to the psychologist is the way in which designs are shown to grow through gradual modifications of pre-existing ideas, as they enter into new relations. Fuller notice will follow.

Outlines of Psychology: based upon the results of experimental investigation. By OSWALD KÜLPE, Professor of Philosophy in the University of Würzburg. Translated from the German (1893) by E. B. TITCHENER, Sage Professor of Psychology in the Cornell University. London: Swan Sonnenschein & Co., New York: Macmillan & Co., 1895. Pp. xi., 462.

This is a good translation of a good book. It is by far the best introduction to Experimental Psychology accessible to the English reader. For Critical Notice of the original work see *Mind*, N.S. Vol. III. No. 11, p. 413.

Tempérament et Caractère: selon les individus, les sexes et les races. Par ALFRED FOUILLÉE. Paris: Félix Alcan, 1895. Pp. xx., 378.

This is the third of the remarkable series of attempts which the French have made to construct a science of character. It is written with all M. Fouillée's charm and lucidity of style. It contains much interesting matter in detail: but its central conceptions expose it to severe criticism. The author starts from the distinction between the innate and acquired character. Before we consider the acquired character, we must consider the innate:—as if the two were not so interfused that any attempt to treat them separately would be impossible. Hence the title of the book: *Temperament and Character*.

In classifying the four temperaments, M. Fouillée employs the physiological distinction between anabolic and katabolic changes. He asserts without proof, without considering whether it be even possible, that, in the sanguine and nervous, there is a persistent and general predominance

of anabolic or synthetic changes over katabolic; and, in the bilious and phlegmatic, of the analytic or katabolic over synthetic. And, in like manner, he attaches to this physiological predominance a psychological predominance of the sensitive processes over the active, or of the active over the sensitive. It does not occur to him that sensation is so intimately connected with muscular action, that to strike a balance between them is impossible. Nor does he even analyse the sense in which this predominance is to be understood. Is a time-excess meant, or an excess in intensity, or in what? In whichever sense we take it, the asserted predominance is unmeaning and unsupported by evidence.

I think that M. Fouillée's classification of character is based on the same fundamental error as his classification of temperament; and, we may add, as his distinction between them. He seems fascinated by the conception that where two processes are inseparable and interfused, it is quite an easy matter to establish a predominance of one of them. He classifies character according to the predominance of one of the three inseparable functions, Feeling, Thought, Will. And here, as his conception is shared by other psychologists, I must consider it more in detail. In fact he only adds thought or intelligence to the classification of M. Ribot; and well shows, as against the latter, that intelligence must be regarded as one of the main formative influences of character. But in what sense is the predominance to be understood? It cannot be in duration: for if the three functions are inseparable, one cannot have a longer life in consciousness than another. Is it in intensity? It is often remarked that when feeling, as pleasure-pain, is at its maximal intensity, thought is at a minimum. Does this mean that thought is relatively simple, that its higher developments are impossible? Obviously it does: but does it mean in addition that the relatively simple thought is reduced to a minimum of intensity? I am doubtful about this. The intensity of the feeling cannot be kept outside the thought which penetrates it. In the extremity of pain or pleasure, we have an intense awareness of the fact. We cannot then infer, when feeling is at its maximal intensity, that it predominates in this respect; only that it involves the relapse of thought to a lower and relatively simple quality. And how are we to adjust these different values, the intensity of feeling and the quality of thought, so as to mean anything by the predominance of one or the other?

And this leads me to the third meaning we may attach to the predominance of a mental function. We may mean its superior quality or development. A man of predominant intellect means a man of a higher quality or development of intelligence. But this also implies what taken apart we may call the fourth meaning of 'predominance.' We may mean superior strength, as estimated by the attainment of its end, and the difficulty of that end. And now we come to the most important distinction. There is an objective, as well as a subjective, predominance. A man of superior intelligence, or of intense feeling, or of strong will, means a man who predominates in one or the other in comparison with the same function in different men, not in comparison with the different functions in himself. And this objective predominance of a function does not involve its subjective predominance. If we ask whether a will which is stronger than the wills of average men is also stronger than its own thought and feeling, the question cannot be answered off-hand, and in part seems unintelligible. How can the will be stronger than thought? Without thought the will is not merely powerless, but non-existent. They are allies, not opponents. I mean speaking generally. There are of course certain kinds of thought which would conflict with the strong will of the man of affairs. He has to confine himself to what is practical. And if

we use thought in a special sense, we may say that his will is developed at the expense of his intelligence; just as in the highest development of thought we may say the intellect is developed at the expense of the will;—not at the expense of the will in general, for it involves a very persistent will, but at the expense of that masterful will which the practical man develops in the conflicts of life. Now as I understand M. Fouillée, he does not mean this special kind of subjective predominance which we all recognise, but that general subjective predominance of one of the inseparable psychical functions over the others which is in the highest degree doubtful and uncertain. "The type of character," he says, "is the result of the mutual relation of the three great psychical functions" (p. 121); and where they are not in equipoise and form a balanced character, there is a predominance of one or two. Does, then, the strong will of the born ruler predominate over his feelings? Certainly in a special sense it does. This or that variety of feeling, as this or that tendency of thought, needs restraint, and his will predominates in the conflict. But, speaking generally, feeling is as necessary to him as thought. Without the master-passion to subdue the wills of other men and accomplish his ambitious projects, where would be the strength of his will? There is a kind of will which is cold and inflexible; and here, if anywhere, we shall find it predominant over feeling. Men of this type M. Fouillée describes as having a strong will with much intelligence and little sensibility (p. 178). They are "the cold energetic calculators that are stopped by nothing in the execution of their plans,"—men of the stamp of Von Moltke or Turenne. Now this is no doubt a genuine type of character, formed, as I should express it, by the conjunction of a *strong* will with a high *quality* of intelligence and little *intensity* of feeling. Consider the different values that are here brought together. What is to be our standard of comparison between them? And what predominance is there other than this objective predominance:—that his will is stronger than the average, the quality of his thought superior; while he falls below the average in the intensity of his feelings?

Now I gather that what M. Fouillée expressly means by the predominance of a function is its superior *intensity* in relation to the other functions:—"C'est le rapport d'intensité entre les trois fonctions de la vie psychique qui se traduit par la forme plus ou moins harmonique du caractère" (p. 121). Apply this to his first type in which feeling predominates. There is little force of will or intelligence. It is the impulsive type so frequently met with among children and young people. The feelings predominate in intensity? But they cannot. The intensity of the feelings penetrates the impulsive will that embodies them. The feelings are an element in the volition; and the intensity of the one qualifies the other. Lastly the little intelligence of the type obviously means an intelligence of low development. Could we possibly interpret it to mean a lower degree of intensity? The ideas of children of strong sensibility are not likely to be weak in intensity, but peculiarly vivacious: the intensity of their feelings is communicated to their ideas.

Thus we are quite unable to interpret this type as due to the subjective predominance of one of the mental functions. The predominance, as in the last, is objective. The feelings are above the average in intensity, while the intelligence falls below the average in quality, and the will in firmness and self-control. I might take separately the other interesting types which M. Fouillée has given us with a like result. I can only interpret them so far as I depart from his principle of classification; which neither he, nor anyone else, can apply intelligibly. But this principle is very plausible, and it was necessary to consider it in detail. I suspect

that an observer of character who is not a psychologist, nor accustomed to define the meaning of his words, would be attracted by it: and as the ordinary man regards thought, feeling, and will, as more or less separate entities within himself, what is more natural than to suppose that one develops independently of the others, and often at their expense?

ALEXANDER F. SHAND.

Étude sur l'espace et le temps. Par GEORGES LECHALAS, ingénieur en chef des ponts et chaussées. Paris: Félix Alcan, 1895.

This book deals with the mathematical and metaphysical, not with the psychological, aspects of space and time. In the first chapter, on geometrical space, the author discusses the nature of geometrical proof. No postulates are required, since, as metageometry shews, all Geometry flows from the mere definition of space, and definitions do not involve the existence of their objects. The justification of a definition lies in the absence of contradiction in its results. Thus general Geometry is apodeictic, but the decision between Euclid and non-Euclid is empirical.

In Mechanics, which is next discussed, we must begin by the choice of a unit-movement, assumed uniform, and chosen from motives of simplicity. We must choose our axes from the same motive; e.g. for axes rotating with the sun, Kepler's laws would be false. This does not involve absolute motion, but only care in the selection of axes. (The difficulty, however, lies in the fact, overlooked by our author, that the axes have to be fixed by reference, not to particular bodies, but to empty space.) The fundamental notion of Dynamics is not force, but mass; the determination of actual masses is empirical, but apart from this, Dynamics follows apodeictically from Geometry.

After a chapter on the Geometry of our universe, which adds little to Chapter I., M. Lechalas discusses the problem of similar worlds and the reversibility of the material universe. The former problem is meaningless, since a proportional change of all temporal and spatial magnitudes would be no change. As to the latter, a reversed world would be unstable and improbable. (This answer does not touch the difficulty—apparently insoluble on a purely mechanical level—which lies in the absence of qualitative difference between past and future in mathematical time.)

From a discussion of Kant's antinomies and Zeno's arguments against motion, the author is led to declare that motion is discontinuous. The difficulties of space have hitherto proved insoluble; as to time, however, the Transcendental Analytic provides a solution, by identifying temporal succession with causation. The discrete irreducible elements of motion, again, afford a natural unit for time-measurement, and correspond to distinct events in the causal chain.

The book is chiefly useful as a bibliography of recent French works on the philosophy of Mathematics; its own solutions almost always evade the fundamental difficulties they are intended to resolve.

B. A. W. RUSSELL.

Das menschliche Handeln. Philosophische Ethik. Von D. Dr A. DORNER, O. Ö. Professor an der Universität Königsberg. Berlin: Mitscher und Rostell, 1895. Pp. xii., 737.

The author of this philosophical work has already won for himself a reputation as metaphysician and theologian. He now seeks to perform for man's active function a service parallel to what he had previously done for the cognitive function. A singularly fresh and comprehensive treatment he has given us. I believe that this massive volume on

philosophical ethics will make his name better known among English-speaking nations than anything he has before done. Broadly and firmly does Professor Dorner bring the whole range of really human action within the sphere and compass of ethical nature and judgment. He would thus avoid the one-sidedness of stress either on the acting subject and his dispositions, or on the product or external result of his action. The conception of action is, with him, the link or *Band* that unites these diverse points of view. Action, with him, does not mean every empirical endeavour possible to man, but only such action as is correspondent with essential man. Regard must be had, he thinks, to the psychological quality whereby the essence of man shews itself—not with any idea of deriving ethics from psychology, but merely of doing justice to psychological occurrences, so far as they come into view in our acting. The psychological basis of ethics must be investigated, yet the ethical life must not be treated as only a particular group of psychological occurrences. Nor does he depend on the empiric development of humanity for the understanding of the ethical, but on those moral ideals which humanity has imaged forth—ideals often enough in antagonism to existing reality. He would in this way attain to the congruent ethical construction of the present. It remains true that the characteristic of the ethical spirit is endpositing activity, which always goes out beyond the merely given character of things that simply happen. Yet Dr Dorner sees how necessary realisation is to ideals, though the realisation can only be partial. He will not renounce all connection of ethics with metaphysic, and resolve ethics completely into psychologic phenomenalism. He thinks Ethics has its religious presuppositions, for ethical life without religion cannot be the most perfect in Kind. Religion does not begin where ethics ends—where, that is to say, there is no more room for man to act. Ethics can cease only where conscious will ceases. It must be possible to be pious and moral—*fromm und sittlich*—at one and the same time. Professor Dorner aims in an especial degree at bringing out the compact unity or unified character of morality; he would demonstrate morality to constitute a totality, and would shew its unconditional validity. He seems to fear that, in treating of the relation of ethics to metaphysic and religion, he may have done more than many modern philosophers will wish, and less than many theologians will ask. I think it certain that some, who—like Professor Dorner himself—are both of these in one, will thank him for his broad and inclusive treatment, and that others, among philosophers at least, will accord him patient and interested hearing. All will admire the exemplary scientific spirit in which he has proceeded, taking it for his chief aim, not to be positive or negative, right or left, but to be true and impartial. Professor Dorner deals in his Introduction with the conception, task, and scope, of philosophical ethics, writing with independent and sustained power of thought, and he is sometimes finely critical and suggestive. Through many modern references he proceeds to shew the insufficiency of the views alike of those who treat ethics as a purely theoretic discipline and of those who resolve it into a thing of purely practical value. Ethical science can never be a purely theoretic discipline so long as it has to do with not only every aspect of what is given, but also, and much more, with the ideal which reaches out beyond our empirical Knowledge. Nor can ethics be viewed as simply something practical. It must mean a widening or enlarging of our knowledge, as becomes a normative or ideal science. But now, taking the ideal as his norm, our author goes on to consider how man may become sure that the ideal is really the highest, and is something scientifically tenable. The unconditional character of morality is firmly maintained by Dr Dorner, although he does not think it quite an easy

matter. He thinks it perfectly intelligible that a number of our newer writers on ethics should give up or quietly put aside the moral imperative. Only, he thinks the unconditional character of the moral imperative will not be done away without morality itself being thereby destroyed. In the First Part of his work he proceeds to deal with the presuppositions of ethics. He touches first on the Kantian attempt—not able, of course, to sustain itself—to ground ethics so completely in itself that, from the standpoint of the absolute autonomy, presuppositions for ethics become no longer necessary. We have a division dealing with the “phenomenology” of the moral consciousness, next a division devoted to metaphysical presuppositions of ethics, and a third division on the religious presuppositions in ethics.

The Second Part of the work proceeds in a very full manner with ethics as system—the system of human action. The first division here deals with the universal features of ethics, and the second develops detailed or particular treatment of ethical system. This latter task is performed in three sections, treating respectively of the doctrines of duty, of virtue, and of the good. Everywhere Professor Dorner wields an easy control over large masses of fact. The practical issues dealt with are not less important than the speculative, to which I have referred. He has given us a timely and masterly contribution to ethics, marked—whether one always agrees or not—by great philosophic insight and grasp. It is, besides, written with a lucidity of style to which, it must be said, not many among his countrymen may lay claim.

JAMES LINDSAY.

Kant-Studien. Von Dr ERICH ADICKES. Kiel und Leipzig: Verlag von Lipsius und Tischer, 1895. Pp. 185.

These *Studies* deal with all the leading questions relating to Kant's intellectual development. The book begins with a sketch of the history of German epistemology from Kant to Leibnitz, which occupies 51 pages. Considering its necessary brevity, this is admirably done. The relation of the principle of “contradiction” and that of “sufficient reason,” in the philosophy of Leibnitz, is set in a clear light, together with the corresponding distinction between truths of reason and truths of fact. Another commendable feature of this part of the work is the emphasis laid on the distinction formulated by Crusius between *principium essendi* and *principium cognoscendi*. In the next section of the work, which deals with Kant's original standpoint, as expressed in the *Nova Dilucidatio* of 1755, the influence of Crusius finds expression in the Kantian distinction between the *ratio antecedenter determinans* and the *ratio consequenter determinans*. But Crusius himself had by no means clearly grasped the nature of the antithesis between ideal and real connexion; and Kant, in 1755, had not advanced so far in this direction as his predecessor. His theory of knowledge is in essentials that of Leibnitz and Wolff. Adickes next discusses what has been called the empirical period in Kant's development. Here he makes an important distinction. We must not confuse Kant's position in 1762-3, with his position in 1765-6. At the earlier date he was still predominantly a rationalist. The empirical tendency, indeed, manifested itself in his refusal to regard the relation of effect and cause as one of predicate and subject in an analytical judgment. But the existence of causal relations still appeared to him to be discoverable through pure reason *a priori*. The simple concepts of real connexion are not derived from sensible experience; they are contained in our own mental preformation, and sense-experience only serves as the occasion of their emergence

into clear consciousness. Thus Kant is here substantially at the standpoint of Leibnitz. In 1763, on the contrary, all judgments of real connexion are regarded as synthetic, in distinction from analytic, and are referred to experience as their source and ground. The next topic considered is the transformation undergone by Kant's thought in the year 1769. Adickes contends, as against B. Erdmann, that this was due to the influence of Hume. His argument appears to us quite inconclusive. He convicts Erdmann of some errors in detail, but leaves his general position unshaken. In the *Dissertation* of 1770, Kant remains essentially a rationalist in his view of the categories. They are innate laws of the mind, discoverable by analysis of inner experience. The nature and proof of their validity is not expounded from the critical standpoint; and it would seem that they are still held to be applicable to things-in-themselves. Their justification by the analysis of the concept of a possible experience, and their strict limitation within the sphere of possible experience, are not to be found in the *Dissertation*; and it is not clear that Kant at this period keenly or clearly felt the difficulties which led to the subsequent critical development. That special awakening from his dogmatic slumber, which he ascribes to Hume, had not at this date taken place. This does not imply that he had not read Hume, but only that, like everybody else, he did not as yet understand him. However profound Kant's mind was, it was certainly not quick in its movements. The last twenty pages discuss the date at which the *Kritik of Pure Reason* was composed, and maintain, in opposition to E. Arnoldt, that it was completed in the first half of 1780, and not in 1779.

Throughout the work there are many points of interest which we have not space to refer to. These *Studies* cannot be neglected by any serious student of Kant.

Geschichte der neueren Philosophie. Eine Darstellung der Geschichte der Philosophie von dem Ende der Renaissance bis zu unseren Tagen. Von Dr HARALD HÖFFDING, Professor an der Universität in Kopenhagen. Erster Band. Unter Mitwirkung des Verfassers aus dem Dänischen ins Deutsche übersetzt von F. BENDIXEN. Leipzig: O. R. Reisland, 1895. London, Williams & Norgate. Pp. xii., 587.

This First Volume deals with the pre-Kantian development of Philosophy. Professor Höffding's work presents features which give it a distinctive value among the many books which deal with the same subject. It is, in our opinion, the most readable of them. It brings out with especial clearness and adequacy the connexion between the development of Philosophy and the general development of culture. It has also the advantage of not being "made in Germany." The impartial Dane gives what we regard as due prominence to English thinkers. He has evidently studied them at first hand. Full notice will follow.

Die moderne physiologische Psychologie in Deutschland. Eine historisch-kritische Untersuchung mit besonderer Berücksichtigung des Problems der Aufmerksamkeit. Von Dr W. HEINRICH. Zürich: Verlag von E. Speidel, 1895. Pp. iv., 232.

Analyses and criticises the doctrine of Attention in Fechner, Helmholtz, G. E. Müller, Pilzecker, Wundt, N. Lange, Külpe, Münsterberg, Ziehen, and Avenarius. He urges against them all that they have not been true to the law of psycho-physical Parallelism. He thinks that they ought to have stated all their explanations in terms of physiology, whereas, in fact, they have recourse, at many points, to purely psychological exposition.

According to Dr Heinrich the true method is first to ascertain the physiological fact, and then to assign its psychical counterpart. We hope, for his own sake, that he will not attempt to apply this method too consistently.

Der Geist der neueren Philosophie. Von ROBERT SCHELLWIEN. Erster Theil. Leipzig: Alfred Janssen. London: Williams and Norgate, 1895. Pp. vii. 163.

The spirit of modern philosophy is understood in this treatise in a strictly historical sense. It excludes all empirical interpretations of consciousness which reveals itself in a continuous progress or movement (p. 6). At first sight, it is strange that this point of view is found compatible with the prominence given to Spinoza, and in fact nearly two-thirds of the book is devoted to a careful and original study of his system. Contrary to established commentaries the author finds the dominant note of Spinoza's thought in the conception of freedom (p. 73), and hence a new interpretation of causality in the philosophy of substance. Although this theory is opposed to the general tendency of critics of Spinoza, Kuno Fischer is singled out for attack upon his assertion that "God acts" must be understood in the sense that things follow (in a mathematical sense) from the nature of God. To this it is replied that the contrary is the truth, it is the fact of God's action that is the primary point in the system, the expression "*ex Dei natura sequitur*" does not explain the expression "*Deus agit*"; but upon the contrary the "*agere*" explains and determines the "*sequi*" (p. 93). From this point of view, it might easily be conjectured, new lights are thrown upon the system in detail, without at the same time verging too widely from its practical results and obvious renderings. In fact the hypothesis gains its plausibility from the fact that action is confined to the Divine sphere and hence the modes remain undisturbed. The present part concludes with an interesting contrast between the causal theories of Spinoza and Darwinian Evolution.

W. R. SCOTT.

Die Grundprobleme der Logik. Von JUL. BERGMANN. Zweite völlig neue Bearbeitung. Berlin: Mittler und Sohn, 1895. London: Williams and Norgate. Pp. 232.

The work, of which this is a second and much altered edition, appeared in 1882,—being a general review of the logical position taken up by the author in a previous work, *Reine Logik*. The present book consists of an Introduction, containing Sections on the sphere and departments of Logic, Formal and Metaphysical Logic, and the procedure of Logic; and two Parts, of which the first treats of Thought and Knowledge, the second of Progressive Knowledge. Critical Notice will follow.

Elementi di Psicologia e Logica ad uso dei licei. Per FRANCESCO Prof. BONATELLI. II. Edizione. Padova: F. Sacchetto, 1895. Pp. 347.

This little manual has reached its second edition in the fourth year of its existence. No changes have been introduced, the author having contented himself with merely 'touching up' the diction in the way of clearness and exactness. His presentation of the subject in two consecutive parts is certainly very lucidly and directly effected so far as it goes. That it can be very adequate is hardly to be expected within such narrow limits—especially in those left over for Logic, viz. only 97 pages. Accordingly we

meet, not seldom, with very sketchy treatment, *e.g.* in the opposition of propositions and in induction, which with a curiously antiquated effect we find treated as syllogism. It would have been a wiser plan to have reserved for a worthier exposition of induction the pages given up to a section on 'metaphysical psychology' with its discussion of the difference between the *io* and the *anima*, and the like. However, it is interesting to follow the exposition of both subjects in its divergences from English methods. But an absence now and again of continuity or evolution of presentation causes it to produce a somewhat disjointed and superficial impression.

RECEIVED also :—

- Frank Granger, *The Worship of the Romans*, London, Methuen & Co., 1895, pp. ix., 308.
- J. M. Robertson, *Buckle and his Critics: a study in Sociology*, London, Swan Sonnenschein & Co., 1895, pp. vii., 565. (Critical Notice will follow.)
- T. W. Taylor, *The Individual and the State: an Essay on Justice*, Boston U. S. A., and London, Ginn & Co., 1895, pp. 90.
- A. Davis, *Elementary Physiology*, (Blackie's Science Text-Books), London, Blackie and Son, 1895, pp. 223.
- W. Tallack, *Penological and Preventive Principles*, Second and Enlarged Edition, London, Wertheimer, Lea & Co., 1896, pp. xii., 480.
- A. E. Giles, *Moral Pathology*, London, Swan Sonnenschein & Co., 1895, pp. viii., 179.
- E. Ferri, *Criminal Sociology*, London, T. Fisher Unwin, 1895, pp. 284.
- A. Lichtenberger, *Le Socialisme au xvi^e siècle*, London, Félix Alcan, 1895, pp. 471.
- L. Dugas, *Le Psittacisme et la Pensée Symbolique*, Paris, Félix Alcan, 1895, pp. 202.
- J. Lourbet, *La Femme devant la science contemporaine*, Paris, Félix Alcan, 1896, pp. viii., 178.
- J.-J. Rousseau, *Du Contrat Social* (Édition comprenant avec le texte définitif les Versions primitives de l'Ouvrage collationnées sur les Manuscrits autographes de Genève et de Neuchâtel), une introduction et des notes par E. Dreyfus-Brisac, Paris, Félix Alcan, 1896, pp. xxxvi., 424.
- L. Mabillean, *Histoire de la Philosophie Atomistique*, Paris, Félix Alcan, 1895, pp. vii., 560.
- M. Jaëll, *La Musique et la Psychophysiologie*, Paris, Félix Alcan, 1896, pp. vi., 170.
- F. H. Ritter von Arneth, *Das classische Heidenthum und die christliche Religion*, Zwei Bänder, London, Williams and Norgate, 1895, pp. 396 and 332.

IX.—PHILOSOPHICAL PERIODICALS.

THE PHILOSOPHICAL REVIEW. Vol. IV., No. 5. **J. Royce.** 'Self-consciousness, Social Consciousness and Nature, (I).' [Continues the discussion, begun in Sept., 1894, of the "External World and the Social Consciousness." Defends and illustrates two theses: (1) "a man is conscious of himself, as this finite being, only in so far as he contrasts himself, in a more or less definitely social way, with what he takes to be the...conscious life of some other finite being"; and "except by virtue of some such contrast" he "cannot become self-conscious"; (2) "the original...of the conception of a non-ego is given to me in my social experiences"; "our conception of physical reality as such is secondary to our conception of our social fellow-beings, and is actually derived therefrom."] **J. Watson.** 'The Absolute and the Time Process, (II).' [If the Absolute is beyond the time-process, there is no possibility of knowledge. Yet an Absolute in process is said to be a self-contradiction. One way of escape is to regard time as a 'mere appearance' (Kant, Bradley). A better way is to look on it as an universal aspect of the states of the real: time is then the thought of pure succession, the conception of every possible succession. The Absolute is not *in* time; it is "the principle of unity presupposed in all succession." On the other hand, were there no succession of events, there would be no Absolute. How shall we conceive of this Absolute? The definitions of it as a substance, a first cause, and an abstract person are inadequate. The Absolute is a "spirit, *i.e.*, a being whose essential nature consists in opposing to itself beings in unity with whom it realises itself"; a "self-alienating or self-distinguishing subject."] **H. Nichols.** 'The Feelings.' ["The feelings are the normal motor-ideas of our instinctive conduct. The brain mechanism of the instincts is non-plastic...The distinguishing characteristic of the feelings, presentatively, is their simplicity. This simplicity is due to the non-serial character of the stimulations which reach the instinct-mechanism, and to this mechanism's lack of that plastic susceptibility which, lending itself to serial modification, is, together with the latter, requisite for presentative organisation and development."] Discussions: **J. H. Hyslop.** 'Desiderata in Psychology.' [Plea for better classification.] **A. T. Ormond.** "'Basal Concepts': a Rejoinder." [Reply to Alexander's criticism, May, 1895.] Reviews of Books. Summaries of Articles. Notices of New Books.

Vol. IV., No. 6. **J. Royce.** 'Self-consciousness, Social Consciousness and Nature, (II).' [Takes up the following positions: (3) "any metaphysical proof that...physical nature exists at all, must also be a proof that behind the phenomena of nature...there is other conscious life finite like our own, but unlike" in so far as it "does not enter into closer social relations with us human beings"; (4) there is a probable proof for "a real finite world called the Realm of Nature"; and as external nature exists by

virtue of a more or less definite appeal to the categories of our social consciousness, this proof points to a finite life behind natural phenomena, "in more or less remote, but socially disposed relations to us": (5) the proof is furnished by the facts of Evolution, and Evolution "promises to become a sort of universal Sociology"; (6) the author's view must not be confused with animism, hylozoism or the doctrine of mind-stuff, with the ideas of Schopenhauer, Schelling or von Hartmann. It differs from them in genesis: it makes of Evolution "the history of the differentiation of one colony of the universal society from the parent social order of the finite world in its wholeness." **N. Wilde.** 'The Question of Authority in Early English Ethics.' [This, the burning question for the sixteenth and seventeenth centuries, was answered with any degree of clearness by Hobbes alone.] **E. M. Bowden.** 'Ethics, Theoretical and Applied.' [Different modes of inquiry are appropriate to the two branches of ethics; the examination in the abstract of the underlying principles which determine the moral quality of the feelings prompting conduct; and the assigning of a particular case, in the concrete, to the category under which it falls.] **W. W. Carlile.** 'Natura naturans.' [The conception of the world as a mechanical system really involves belief in the existence of a mechanician outside it. Illustrations from language, institutions, physiology; criticism of Mill. The predicates of the universal mind; criticism of Hegel.] Discussions: **D. S. Miller.** 'Professor Watson on Professor Fullerton's Translation of Spinoza.' [Defence of Fullerton.] **J. H. Hyslop.** 'An Explanation.' [Of misprints in his *Ethics*.] Reviews of Books. Summaries of Articles. Notices of New Books. Notes.

THE PSYCHOLOGICAL REVIEW. Vol. II., No. 5. **J. Royce.** 'Some observations on the Anomalies of Self-Consciousness, (I).' [Our inner notion of the self of self-consciousness is (1) a mass of somewhat vaguely localised sensory contents, and (2) feelings of self-possession or spontaneity, in virtue of which the self appears to control the train of association, impulses, and acts of attention and of choice. This primary self-consciousness grows so as to include (3) the self of past and future, and (4) social and professional self-estimation. All four stages of the self are liable to forms of diseased variation. On the formation of the complex self, its liability to variation, and the reason of variation in definite directions, we may throw light by asking: How do we get the habit of drawing a boundary, in consciousness, between ego states and non-ego states? How is it that the ego shifts with alteration of the non-ego? And how does the ego become so intimately related to the sensations of the common sensibility? The answers offered are in substantial agreement with those given by Baldwin (*Mental Development*), and follow from the writer's philosophical discussions of self-consciousness in the *Phil. Rev.*] **H. Ellis.** 'On Dreaming of the Dead.' [In a certain type of dream the dreamer sees a dead person as alive, and has to account for the image; the most obvious theories are either that the dead person has not really died, or that he has returned from the dead. The type may have an anthropological significance.] **S. F. McLennan.** 'Emotion, Desire and Interest: Descriptive.' [Parallel analyses of emotion and desire.] **R. M. Bache.** 'Reaction-time with Reference to Race.' [Simple impressions, auditory, visual, or tactual, "invite secondary reflex action." Hence low races should react more quickly than high. Experiments on eleven Indians, eleven Africans, and twelve Caucasians, give some support to the hypothesis.] Discussions: **H. Nichols.** 'Pain Nerves.' [Against Strong's view that pain impulses are exaggerations of tactual and temperature impulses, and are conducted inward by the same fibres.] **J. M. Baldwin.** 'Professor Watson on Reality

and Time.' [Reality in its completeness cannot be merely a thinkable reality: if thinkable, it must have the quality of moving the possible thinker by way of belief, ethical appreciation, etc. But it may be so simple as to be unthinkable, resting "in its own limpid immediacy."] Psychological Literature. Notes.

Vol. II, No. 6. **D. S. Miller.** 'The Confusion of Content and Function in Mental Analysis.' [A confusion, frequent in psychological controversy, "consists in supposing that mental causes...must themselves be an index, by the internal evidence they offer, of the train of consequences that they entail,"—that content is a sufficient key to function. Instances are given to prove the mischief which follows upon this confusion.] **J. M. Baldwin.** 'The Origin of a "Thing" and its Nature.' [Statements of nature are mostly statements of origin. These do not exhaust the reality of a thing, however, since the reality not only has had but is about to have a career. To rule out teleology (prospective organisation) would be fatal to science. A thing's natural history does not show that it has no worth beyond the details of that history. Every mental content begets and confirms the retrospective attitude, but also begets the expectant or prospective attitude.] **J. Royce.** 'Some Observations on the Anomalies of Self-consciousness, (II).' [Details of a case of deranged self-consciousness. Summary of this and the preceding paper: (1) self-conscious functions are primarily social functions; (2) in primary contrasts of ego and non-ego, the ego includes modifications of the common sensibility and the feelings of control, while the non-ego is colder, better localised and less controllable; (3) emotions and masses of common sensation become associated to social situations; (4) different forms of the association give rise to memorial and to reflective self-consciousness (we may be self-conscious "even when quite alone with our own states"); (5) the anomalies of self-consciousness are either primary alterations of common sensation, suggesting anomalous social situations, or primary anomalies in social habits themselves.] **G. Tawney.** 'The Perception of Two Points not the Space-Threshold.' [Preliminary work along the lines recently laid down by Külpe, but without reference to Külpe's discussion.] Discussion and Reports: **H. R. Marshall.** 'Physical Pain.' [Defence of the author's *qualie*-theory against Strong.] **J. H. Claiborne.** 'A Case of Subjective Pain.' [Pain was suffered, during and after an operation, "for which there was no apparent cause." As agreeable and disagreeable images were voluntarily aroused, relief and pain succeeded one another.] Psychological Literature. Notes.

THE AMERICAN JOURNAL OF PSYCHOLOGY. Vol. VII, No 1. Editorial. **T. R. Robinson.** 'Experiments on Fechner's Paradoxon.' **A. Kirschmann.** 'Remarks on the Foregoing Article.' [The phenomenon is dependent on the absolute intensity of the light employed. Points of doubt are whether it occurs in the case of real binocular combination with tridimensional properties, and in that of partly coincident double-images.] **J. O. Quantz.** 'The Influence of the Colour of Surfaces on our Estimation of their Magnitude.' [Moderately sized surfaces on darker background are overestimated at the less refrangible, and underestimated at the more refrangible end of the spectrum. Similar and similarly seen surfaces, white or coloured, are underestimated when moving to or from the eye.] Minor Studies from the Laboratory of Cornell University: **W. B. Pillsbury.** 'Some Questions of the Cutaneous Sensibility.' [Determination of the space limen by Weber's localisation method, corrected to meet Czermak's objection, etc.] **D. R. Major.** 'On the Affective Tone of Simple Sense Impressions.' [An attempt to employ the serial method in the domains of sight, sound and touch. Many of the results are in opposition to those of

Cohn (*Phil. Stud.*, x., 4).] **E. B. Titchener**. 'A Psychophysical Vocabulary.' [German-English.] Minor Studies from the Laboratory of Wellesley College: **M. W. Leary**. 'The "Continued Story".' [Nearly 75% of children have continued stories; girls slightly more often than boys. Character and origin of the stories.] **M. W. Calkins**. 'Synaesthesia.' ['Forms,' varieties of pseudochromaesthesia, associations of colour with sound and shape, etc. Explanations. Specimen questionnaire.] Psychological Literature. [**G. S. Hall** on Psychical Research.] Notes.

REVUE PHILOSOPHIQUE, 20^{me} Année, No. 9. (Septembre, 1895.) **Dugas**. 'Auguste Comte: Étude critique et psychologique (I.)' [Discusses first the inner coherence of Comte's philosophy. He falls into inconsistencies in his view of the relation between "heart" and intellect. On the one hand, he makes scientific knowledge the basis of progress; on the other, he regards scientific knowledge as useless without the "enthusiasm of humanity"; whereas this enthusiasm, even apart from scientific training, is capable of supreme insight and has supreme value. A general sketch is then given of the life of Comte. His utterly unpractical character is well brought out. Intensely pre-occupied by ideal aims and principles, he was thereby rendered blind to the facts of ordinary life. Fallacies of memory were of constant occurrence with him. He always represented past events in his life, not as they *were*, but as they *ought to have been* from his point of view at the time being. The general impression left on the reader by this account is that no one was ever further removed from being a Positivist than Comte.] **G. Milhaud**. 'La métaphysique aux Champs-Élysées.' [A dialogue between the spirits of Protagoras, Plato, Anselm, Descartes, and Kant. The subject is the ontological proof of the existence of God. The discussion is interesting, but not very edifying.] **Cresson**. 'Une morale matérielle est-elle impossible?' [All conation, in reaching its end, ceases. Whatever therefore brings about permanently and finally the cessation of Will, is the ultimate end of human existence. But a perfect being, having all he is in need of, has no Will: therefore perfection is the moral ideal.] **Adam**. 'Note sur le texte des "Regulae ad directionem ingenii" de Descartes.' Analyses et comptes rendus.

No. 10. (Octobre, 1895.) **L. Arréat**. 'Le "Parlement des religions."' **Ch. Féré**. 'La physiologie dans les métaphores.' [Even in animals we find gestures expressive of emotion which may be regarded as a kind of metaphor. In ordinary language words and phrases are current which refer to the physiological concomitants of emotional states.] **Dugas**. 'Auguste Comte: Étude critique et psychologique (Fin).' [Deals with the intellectual and the emotional life of Comte. Aided by a retentive memory and great power of logical arrangement, he amassed in his early youth all the knowledge which he considered necessary as a basis for philosophising. After this, he read no more: but devoted the rest of his life to unifying the results of the special sciences, so as to make them fruitful in view of human needs. In time, the exclusive devotion to theorising led to vagueness and mysticism. The presentation of the sentimental aspect of Comte's life consists mainly in an account of his relations with Madame De Vaux.] **Lauts et Henri**. 'Esthétique et Astigmatisme.' Notes et discussions. Revue générale, &c.

REVUE DE MÉTAPHYSIQUE ET DE MORALE. 3^{me} Année. No. 5. **G. Noël**. 'La Logique de Hegel: La logique dans le Système (*suite*).' [A thoroughly Hegelian essay, in which the writer tries to vindicate Hegel against the charges, often urged against him, of reasoning in vicious circles. The paper well deserves study: but its closely woven argument does not admit of being

intelligibly presented in a short abstract. We quote the following to show the essayist's standpoint. "The last word of the system is not the Idea in its primitive abstraction: the last word is Mind—the Idea which thinks itself in thinking all things. It is in certain ways the *νόησις νοήσους* of Aristotle. But there is this great difference between Hegel's Conception and that of Aristotle, that this inner life of pure thought does not [for Hegel] exclude, but rather contains and presupposes, the material world. It is in thinking Nature, and *because* it thinks Nature, that the supreme Thought thinks itself." (Surely Aristotle is here to be *compared*, not *contrasted*, with Hegel.) **M. Hauriou.** 'L'alternance des Moyen-Ages et des Renaissances, et ses Conséquences Sociales.' [A study of two laws of periodic change in the historical development of thought, which were overlooked by Comte, and are, to some extent, in conflict with his famous generalisation of The Three Stages.] **L. Dimier.** 'Le Modelé dans la peinture, et la troisième dimension (à propos des manuscrits de Léonard de Vinci).' *Études Critiques. Discussions.*

No. 6. **H. Poincaré.** 'L'Espace et la Géométrie.' [A paper developing a former sentence of the author's to the effect that other beings, with minds and senses like ours, but without previous education, might receive from a certain kind of external world impressions whereby they would be led to construct a non-Euclidean geometry, and to localise the phenomena of their external world in a non-Euclidean space, or even in a space of four dimensions. We, if transferred suddenly to this new world, could, without difficulty, accommodate its phenomena to our Euclidean notion of space. A very ingenious paper whose main conclusion is, that, though experience plays an indispensable rôle in the genesis of geometry, yet it would be an error to infer that geometry is, even in part, an empirical science.] **L. Dugas.** 'Psychologie du Nominalisme.' [This article is announced as an extract from a book destined to appear in the Alcan Library, entitled *Le Peintacisme et la Pensée Symbolique*. "Abstraction is *logical* on these conditions, but it remains to be seen whether these conditions can be fulfilled; in other words, whether abstraction is *psychologically real*." For purely scientific concepts the words we use are wholly without images. "A science is a well-constructed language"—but this language has a meaning.] **A. Spir.** 'Nouvelles Esquisses de Philosophie Critique (*suite*),—Du Principe agissant de la Nature.' ["Force—the power of producing effects—is no property of any individual object." "Nature has a side withdrawn from our perception, on which all the manifold diverse phenomena of perception are connected, in other words, form an *unity*. This side—that of Nature's Unity—is the active principle, the *natura naturans*, often erroneously confounded with God, really nothing but Nature itself, so far as it has one side withdrawn from perception." An article which shows how metaphysics will insist on coming in, though one strive to keep it out 'with a pitchfork.'] *Discussions. Études Critiques.*

PHILOSOPHISCHE STUDIEN. Bd. XL, Heft 4. **F. C. C. Hansen** und **A. Lehmann.** 'Ueber unwillkürliches Flüstern.' [Experiments on thought-transference. Proof that no new mode of energy, "radiation," is developed in purporting transference of visual images from person to person. Successful thought-transference depends upon involuntary whispering. Proof of this directly, in experiments with and without suppression of vocal innervation; and indirectly, by a phonetic analysis of the whisper, and a comparison of the confusions of word with word, occurring in the writer's investigation and in results published by the *S.P.R.*, with the confusions to be expected upon phonetic principles. The carrying power and modes of production of the unconscious whisper.] **T. Heller.** 'Studien zur

Blinden-Psychologie, Schluss.' [The association of ideas of touch and hearing. The 'sense of distance' of the blind. Surrogate ideas (Hitschmann).] **P. Mentz.** 'Die Wirkung akustischer Sinnesreize auf Puls und Athmung (Schluss).' [Voluntary attention. Experiments involving listening to continuous compositions. Conclusion: the pulse changes observed are not the result of respiratory changes; the two series are parallel. It is clear that the effects of sensations, feelings, emotions and voluntary attention are far more widely diffused in the organism than has ordinarily been supposed. Need of further research in this sphere.] **A. Thiéry.** 'Ueber geometrisch-optische Täuschungen (Fortsetzung).' [Illusions of magnitude. 1. Illusions with equal figures cut by parallel transversals. 2. Illusions with linear distances cut by convergent transversals.]

ZEITSCHRIFT FÜR PHILOSOPHIE UND PHILOSOPHISCHE KRITIK. Bd. CVII., Heft 1. **H. Siebeck.** 'Platon als Kritiker aristotelischer Ansichten.' [A highly interesting and important paper written from a new standpoint. Siebeck proceeds upon the assumption that Aristotle before the close of his twenty years' acquaintance with Plato published some criticisms of his master to which the latter may be supposed to have replied. From this standpoint the *Parmenides* is once more examined. Siebeck finds that its purpose is to answer objections to Plato's Theory of Ideas which Aristotle had started in early life, and published in an early work—*περί φιλοσοφίας*. These objections were afterwards transferred to the first book of the *Metaphysics*, where they are now read by us. We are glad to see that Dr Siebeck makes use of Mr Jackson's valuable papers on this subject in the *Journal of Physiology*: he does not, however, seem to have read Mr Waddell's recently published edition of the *Parmenides*.] **P. van Lind.** 'Immanuel Kant, und Alexander von Humboldt.' [Concludes a series of papers, chiefly physical and astronomical, in which the position of Kant is examined and vindicated. The writer believes the sage of Königsberg to have been the greatest of all speculative or moral philosophers.] **Dr Joh. Hebingen.** 'Die philosophischen Schriften des Nikolaus Cusanus (III).' [Contains a long bibliographical and general account of the works of this fifteenth-century writer—"a great Platonist, whose philosophic vision reaches back into the depths of venerable antiquity, and forward into a boundless futurity."] **Friedrich Jodl.** 'Jahresbericht über Erscheinungen der Anglo-Amerikan. Litteratur aus dem Jahre 1893.' [Among authors whose works are reviewed are Leslie Stephen—of whom very complimentary words are used—Calderwood, H. Spencer, Lodge, Williams, MacDonald.] Recensionen &c.

VIERTELJAHRSSCHRIFT FÜR WISSENSCHAFTLICHE PHILOSOPHIE. XIX. Jahrgang, Heft 3. **G. Helm.** 'Ueber die Hertz'sche Mechanik.' [Hertz eliminates the conception of force from the Newtonian mechanics, by substituting for it in every case the geometrical conditions under which movement takes place.] **A. Marty.** 'Ueber subjectlose Sätze und das Verhältniss der Grammatik zu Logik und Psychologie (vii. *Schluss*).' [Having in a previous article expounded his view of the double judgment, as consisting in (1) affirmation of the existence of a subject, and (2) ascription to it of a predicate, Marty now proceeds to consider its grammatical formulation. It finds appropriate expression in the categorical proposition. Marty combats the view that the categorical proposition is primarily or specially a statement of the relation between *thing* and *property*, or *substance* and *accident*. He next discusses what he calls "categoroid" judgments. These have categorical forms, but do not affirm the existence of their subject. His examples include such propositions as "All equilateral triangles are equiangular." This is, according to him, really a

negative judgment. It means there are no equilateral triangles which are not equiangular. We cannot affirm an attribute of a subject without affirming the existence of the subject. The remainder of the article is occupied with an attempt to distinguish true impersonals from propositions which are impersonal only in grammatical form. The views of Erdmann and Puls on this point are criticised.] Anzeigen &c.

PHILOSOPHISCHES JAHRBUCH. Bd. VIII., Heft 3. **Von Hertling.** 'Ueber Ziel und Methode der Rechtsphilosophie (continued).' [The writer continues his criticism of Merkel's *Elemente der allgemeinen Rechtslehre*, especially in regard to his denial of the dependence of law on morality.] **L. Schütz.** 'Der hl. Thomas v. Aquin u. sein Verständniß des Griechischen.' [St Thomas had seen some books of Aristotle in Greek; this does not mean that he had read them. On the other hand, if his false Greek etymologies proved anything, we might conclude *a simili* that he did not know Latin. But we find in his works (1) wrong translations of familiar Greek words (e.g. *hebdomas* = *editio*!); (2) words which are not even Greek (e.g. *epicacocharchia* for *ἐπιτακτηρία*); and the number of such words proved that he was ignorant of the language.] **E. Rolfes.** 'Die vorgebliche Präexistenz des Geistes bei Aristoteles (concluded).' [A passage at the end of *Metaphys.*, ch. III., is a decisive denial of the pre-existence of the soul.] **J. Uebinger.** 'Die mathematischen Schriften des Nik. Cusanus.' [This paper, at first biographical, follows Nicholas of Cusa step by step in his studies at Padua and in his own country; it then goes into a detailed examination of his ideas. The most curious part is his application of mathematics to theology. Some have represented God as an infinite straight line, some as a triangle, some as a circle, some as a sphere; he says they are all of them right; for, if a line were infinite, it would be a circle, a triangle, and a sphere at the same time. And he proves it. (To be continued).]

Heft 4. **Von Hertling.** 'Ueber Ziel und Methode der Rechtsphilosophie (concluded).' [Human social life is based on the ethical idea of duty, of which law merely carries out the dictates. Mere experience cannot give binding force to law, for it cannot account for the binding power of morality itself.] **B. Adlhoeh.** 'Der Gottesbeweis des hl. Anselm (continued).' [St Anselm's demonstration of God's existence is conclusive as a psychological, not as an ontological, proof. It is not an *a priori*, but an *a posteriori*, or, at most, an *a simultaneo* process. We have the idea of the Infinite; if it did not really exist, we could not have that idea. With other ideas this is not the case; the existence which they imply may be merely notional, not real. A discussion follows, in scholastic form, refuting various arguments to the contrary.] **Schanz.** 'Der Parsismus (concluded).' [In this second paper, there is a short account of the Parsee cosmology, of its narrative of the Creation, the Fall and the Deluge, and of the vague idea of the Trinity, the Incarnation, and the Atonement which it contains; also of its priesthood, temples, sacrifices, purifications, and various ceremonies by which the whole life of a Parsee was and is governed.] **Uebinger.** 'Die mathematischen Schriften des Nik. Cusanus (continued).' [The writer here goes on to notice, not without a plentiful sprinkling of biographical facts and dates, Nicholas of Cusa's investigations concerning the quadrature of the circle; his criticism of Archimedes's solution, and his attempt to solve the question by a method of his own. His demonstration is given at length, together with a diagram. It did not satisfy him, and the wider problem, 'how to find a straight line equal to a given curve,' which he at first thought insoluble, gave rise to his great work, *De Geometricis Transmutationibus*.]

ARCHIV FÜR SYSTEMATISCHE PHILOSOPHIE. Band I., Heft 4. **G. Frege**, 'Kritische Beleuchtung einiger Punkte in E. Schröders Vorlesungen über die Algebra der Logik.' **A. Spir**, 'Wie gelangen wir zur Freiheit und Harmonie des Denkens?' JAHRESBERICHT über die Erscheinungen auf dem Gebiete der systematischen Philosophie: (I.) **F. Jodl**, 'Jahresbericht über die Erscheinungen der Ethik aus dem Jahre 1895.' (II.) **R. Ardigo**, 'Rassegna dei lavori di Filosofia sistematica pubblicati in Italia dal gennajo 1893 al luglio 1894.' Bibliographie der philosophischen Litteratur des Jahres 1894. Zeitschriften &c.

PFLÜGER'S ARCHIV. F. D. GESAMMTE PHYSIOLOGIE. Bd. 57, Heft 10-11. **F. Matte**, 'Experimenteller Beitrag zur Physiologie des Ohrlabyrinthes.' **J. Bernstein**, 'Ueber die specifische Energie des Hörnerven, die Wahrnehmung binauraler (diotischer) Schwebungen, und die Beziehung der Hörfunktion zur statischen Funktion des Ohrlabyrinths.' **W. A. Nagel**, 'Experimentelle sinnesphysiologische Untersuchungen an Coelenteraten.'

Bd. 58, Heft 5-6. **L. Hermann and F. Matthias**, 'Phonophotographische Untersuchungen.' V. 'Die Curven der Consonanten.' With **A. Ehrhardt**. VI. 'Nachtrag zur Untersuchung der Vocalcurven.'

Bd. 59, Heft 1-2. **A. Bruck**, 'Ueber die Beziehungen der Taubstummheit zum sogenannten statischen Sinn.' Heft 5-6. **J. R. Ewald**, 'Zur Physiologie des Labyrinths. III. Das Hören der labyrinthlosen Tauben.' Heft 7-8. **E. Hering**, 'Ueber angebliche Blaublichheit der Fovea centralis.' **W. A. Nagel**, 'Der Sensibilität der Conjunctiva und Cornea des menschlichen Auges.' **W. A. Nagel**, 'Zur Prüfung des Drucksinnes.'

Bd. 60, Heft 1-2. **H. Pretori and M. Sachs**, 'Messende Untersuchungen des farbigen Simultancontrastes.' Heft 3-4. **L. W. Stern**, 'Taubstummensprache und Bogengangsfunktionen.' **J. R. Ewald and I. H. Hyde**, 'Zur Physiologie des Labyrinths.' IV. 'Die Beziehung des Grosshirns zum Tonuslabyrinth.' **J. Loeb**, 'Ueber den Nachweis von Contrasterscheinungen im Gebiete der Raumempfindungen des Auges.' **E. Hering**, 'Ueber das sogenannte Purkinje'sche Phänomen.' Heft 5-6. **A. König**, 'Ein kurzes Wort zur Entgegnung und Berichtigung.' [Against Hering, Bd. 59, Heft 7-8.] **A. Schapfing**, 'Findet die Perception der verschiedenen Farben nicht in ein und derselben Lage der Netzhaut statt?' Heft 9-10. **J. Loeb**, 'Zur Physiologie und Psychologie der Actinien.' Heft 11-12. **F. Melde**, 'Ueber "resultirende" Töne sowie einige hierbei gemachte Erfahrungen.'

Bd. 61, Heft 1-3. **E. Sauberschwartz**, 'Interferenz-Versuche mit Vocalklängen.' **E. Hering**, 'Ueber angebliche Blaublichheit der Zapfen-Sehzellen.' **J. Bernstein**, 'Ueber das angebliche Hören labyrinthloser Tauben.' Heft 4-5. **L. Hermann and H. Hirschfeld**, 'Weitere Untersuchungen über das Wesen der Vocale.' **H. Strehl u. a.**, 'Beiträge zur Physiologie des inneren Ohres.' Heft 6. **W. Wundt**, 'Zur Frage der Hörfähigkeit labyrinthloser Tauben.'

RIVISTA ITALIANA DI FILOSOFIA. March—April. **S. Ferrari**, 'Rodolfo Seydel e la sua opera postuma sulla Filosofia della Religione.' [Seydel was chiefly interested in the Philosophy of Religion. His inspiration came from C. Weiss. His own treatment of the subject followed closely Kantian lines.] **F. Cicchitti Suriani**, 'La dottrina dell' Induzione secondo un' opera recente del Prof. Benzoni.' **M. Novaro**, 'Il concetto di infinito e il problema cosmologico.' [Criticises the teaching of Kant, Leibnitz, Locke, and others on this subject.] Bibliografia &c.

May—June. **C. Cantoni**, 'Luigi Ferri.' [An obituary notice and eulogy.] **L. Credaro**, 'Le basi della teorica Herbartiana dell' istruzione.' [A review of Herbart's work on Theory of Education. It is claimed for him that he was the first who clearly emphasised the importance of educational training

as distinguished from mere communication of knowledge.] **S. Ferrari.** 'Rodolfo Seydel e la sua opera postuma sulla Filosofia della Religione. (II),' **M. Novaro.** 'Il concetto di infinito e il problema cosmologico.' Bibliografia &c.

VOPROSY FILOSOFII I PSYCHOLOGII. May, 1895. **W. A. Wagner.** 'On Music, its origin and development.' [Music as an art could not have been developed before articulate language. Now, its development proceeds neither from sexual nor natural selection; this is proved in many ways, but chiefly by the low condition of music among modern savage tribes. Its evolution has been simultaneous with civilisation.] **A. A. Kozloff.** 'Tolstoi's "Master and Man".' **W. S. Solovieff.** 'On Virtue.' [The three fundamental elements of morality (shame, mercy, and religious feeling), may be considered as virtues, and, consequently, as rules of conduct, and productive of happiness. All the other so-called virtues are virtues only in so far as they harmonise with these three elements. Here the author analyses the cardinal, the theological, and other virtues successively to prove his point.] **L. M. Lopatin.** 'A Parallelistic theory of psychical life.' [Advocates theory of Parallelism between psychical and physiological process; but denies that it is complete.] **V. Henri.** 'On the present state of experimental Psychology.' [A short sketch of the origin and progress of this science is followed by a summary of its methods, with details of the various experiments, their results, their classification, and the influence of different mental conditions on these results; and, in conclusion, many questions are noted which have as yet not been investigated.] **P. N. Ardasheff.** 'The Psychology of History.' [Reviewing M. Le Bon's work, *Les lois psychologiques de l'évolution des peuples*, M. Ardasheff, commending him for reducing historical to psychological processes, criticises his over-estimation of racial, to the detriment of individual factors.] **M. I. Karinski.** 'The Real and the Imaginary Kant.' [A paper which closes his controversy with M. Vvedenski on this subject.]

September, 1895. **M. Korelin.** 'An Ethical Tractate by Lorenzo Valla.' [An analysis of the work of the celebrated humanist, which was published at Padua in 1831. It was cast in the form of a dialogue between Leonardo Bruno, Beccadelli, and Niccolo Niccoli, and contains a full exposition of Valla's ethical convictions. Bruno, an adherent of Stoicism, expounds that view in the first part. In the second, Beccadelli upholds absolute Hedonism, in the third, Asceticism is maintained by Niccoli. At the close, Tartarini, one of the company, sums up, examining the various arguments, and visibly leaning towards Beccadelli's point of view. The paper goes on to investigate the literary and scientific value of the treatise.] **A. Kozloff.** 'God, as felt and as known; a return to the Ontological proof of God's existence.' [Between the feeling of God, and the knowledge that He exists, there is a passage; but the difference is merely quantitative. God's reality is at once the highest and the most immediate of feelings. Space and time can by no means come into the definition of this idea. We are best enabled to form a notion of God's characteristics, by what we feel of our own substantial individuality and attributes.] **M. Solovieff.** 'On the physical factors of right conduct.' [A criticism of Utilitarianism.] **Trubetskoy.** 'Ethics and Dogmatism.' [This paper is a critical examination of Hatch and Harnack's views as regards the relations between Christianity and Hellenism. The principle and the end of Christianity are contained in the doctrines of the Incarnation and of the Resurrection. Neither of these doctrines can receive a historical explanation, as originating in a development of Hellenic thought. The Nicæan Creed is not a product of the Greek mind. Primitive Christianity and the Nicæan Creed have the same religious foundation and origin.]

X.—NOTES.

THE THIRD INTERNATIONAL CONGRESS OF PSYCHOLOGY.

THE third meeting of the Congress will be held at Munich, from August 4th to 7th, 1896. The president will be Prof. Dr Stumpf, the vice-president Prof. Dr Lipps, and the general secretary Dr Frhr. von Schrenck-Notzing. The list of members of the International Committee of Organisation includes the names of many well-known psychologists from England, Scotland, France, Germany, Belgium, Switzerland, Russia, Denmark, and America.

"All Psychologists and all educated persons who desire to further the progress of Psychology and to foster personal relations among the students of Psychology in different nations are **invited to take part** in the meetings of the Congress."

On receipt of the subscription money (15\$.) a card will be sent to every member entitling him to attend all meetings and festivities, and to receive the daily journal *Tageblatt*, and one copy of the Report of the Congress.

The languages used at the Congress may be German, French, English, and Italian. The meetings will take place at the Royal University.

The length of the papers or addresses is limited to 20 minutes, and a short abstract of their contents should be sent to the Secretary before the beginning of the Congress, for distribution among the audience.

Psychologists who intend to offer papers or addresses at the Congress should state the subjects of their communications and send written abstracts of them to the Secretary's office (Munich, Max-Josephstr. 2) before May 15th, 1896.

Lodgings should be secured in advance, as the Munich hotels are generally crowded in the beginning of August.

Information about hotels, pensions and private lodgings will be given to members of the Congress at the office of the "Verein zur Förderung des Fremdenverkehrs."

The Secretary's office will be at the Royal University (Ludwigstrasse 17) during the Congress, from August 3rd onward.

The programme of work is as follows :

I. Psychophysiology.

(Prof. Rüdinger, Prof. Graetz, and Privatdocent Dr Cremer will give all information concerning this part of the programme.)

A. ANATOMY AND PHYSIOLOGY of the brain and of the sense-organs (somatic basis of psychical life).

Development of nerve-centres; theory of localisation and of neurons, paths of association and structure of the brain.

Psychical functions of the central parts; reflexes, automatism, innervation, specific energies.

B. PSYCHOPHYSICS. Connexion between physical and psychical processes; psychophysical methods; the law of Fechner. Physiology of the senses (muscular and cutaneous sensibility, audition, light-perception, *audition colorée*); psychical effects of certain agents (medicines). Reaction-times. Measurement of vegetative reactions (inspiration, pulse, muscle-fatigue).

II. Psychology of the normal individual.

- (Prof. Lipps, Privatdocent Dr Cornelius, and Dr Weinmann will give all information concerning this part of the programme.)
- Scope, methods and resources of Psychology. Observation and experiment.—Psychology of sensations.—Sensation and idea, memory and reproduction.—Laws of association, fusion of ideas.—Consciousness and unconsciousness, attention, habit, expectation, exercise.—Perception of space (by sight, by touch, by the other senses); consciousness of depth-dimension, optical illusions. Perception of time.
- Theory of knowledge. Imagination. Theory of feeling. Feeling and sensation. Sensual, aesthetical, ethical and logical feeling. Emotions. Laws of feeling.—Theory of will. Feeling of willing and voluntary action. Expressive movements. Facts of ethics.—Self-consciousness. Development of personality. Individual differences.
- Hypnotism, theory of suggestion, normal sleep, dreams.—Psychical automatism.—Suggestion in relation to paedagogics and criminality; paedagogical psychology.

III. Psychopathology.

- (Prof. Dr Grashey, Dr Frhr. v. Schrenck-Notzing, and Edm. Parish will give all information on this part of the programme.)
- Heredity in Psychopathology; Statistics.—Can acquired qualities be transferred by inheritance?—Psychical relations (somatic and psychic heredity), phenomena of degeneration, psychopathic inferiority (insane temperament).—Genius and degeneration; moral and social importance of heredity.
- Psychology in relation to criminality and jurisprudence.
- Psychopathology of the sexual sensations.
- Functional nerve-disease (hysteria and epilepsy).
- Alternating consciousness; psychical infection; the pathological side of hypnotism; pathological states of sleep.
- Psychotherapy and suggestive treatment.
- Cognate phenomena: mental suggestion, telepathy, transposition of senses; international statistics of hallucinations.
- Hallucinations and illusions; imperative ideas, aphasia and similar pathological phenomena.

IV. Comparative Psychology.

- (Prof. Dr Ranke, Dr G. Hirth, and Dr Fogt will give all information in this department.)
- Moral-statistics.
- The psychical life of the child.
- The psychical functions of animals.
- Ethnographical and anthropological psychology.
- Comparative psychology of languages; graphology.

Those who desire further information should apply to Prof. Sidgwick, Newnham College, Cambridge, or to Prof. Sully, 1, Portland Villas, East Heath Road, Hampstead, N.W.